

JOURNAL

OF THE

American Geographical Society

OF

NEW YORK.

M.DCCC.LXXIV.

VOL. VI.



Printed for the Society by the State of New York.

1876.

WEED, PARSONS AND COMPANY,
PRINTERS AND STEREOTYPERS,
ALBANY, N. Y.

G12
A5126j
v.6

STATE OF NEW YORK.

No. 48.

IN SENATE,

February 17, 1875.

ANNUAL REPORT

OF THE AMERICAN GEOGRAPHICAL SOCIETY OF NEW
YORK, FOR THE YEAR 1874.

AMERICAN GEOGRAPHICAL SOCIETY, COOPER INSTITUTE, }
NEW YORK, February 25, 1875. }

Hon. WILLIAM DORSHEIMER,

President of the Senate of the State of New York:

SIR — In conformity with the provisions of the act incorporating this Society, I have the honor to transmit herewith the Annual Report of the American Geographical Society, for the year 1874.

Very respectfully yours,

ALVAN S. SOUTHWORTH,

Recording Secretary.

OFFICERS AND COUNCILLORS FOR 1875.

PRESIDENT:

CHARLES P. DALY.

VICE-PRESIDENTS:

FRED. A. CONKLING, FRANCIS A. STOUT, GEO. W. CULLUM.

FOREIGN CORRESPONDING SECRETARY.

JAMES MÜHLENBERG BAILEY.

DOMESTIC CORRESPONDING SECRETARY:

WILLIAM H. H. MOORE.

RECORDING SECRETARY:

ALVAN S. SOUTHWORTH.

TREASURER:

GEORGE CABOT WARD.

COUNCILLORS:

WILLIAM REMSEN,	E. R. STRAZNICKY,
T. BAILEY MYERS,	ISAAC BERNHEIMER,
WILLIAM TILDEN BLODGETT,	ROSWELL D. HITCHCOCK,
WILLIAM E. CURTIS,	SAMUEL L. M. BARLOW,
THEODORE W. DWIGHT,	HARLOW M. HOYT,
ELIAL F. HALL,	H. MANIGAULT MORRIS,
WILLIAM JONES HOPPIN,	CHARLES A. JOY,
WALTON W. EVANS.	

CONTENTS.

	Page.
List of Officers and Councillors	v
Charter of Incorporation	2
Amended Charter	4
By-Laws	6
Honorary, Corresponding and Resident Fellows	15-29
Transactions of the Society for 1874	33

PAPERS READ BEFORE THE SOCIETY:

I. Annual Address of Chief Justice Daly. The Geographical Work of the World for 1873. Delivered January 13, 1874.	58
II. Proceedings of the Arctic Meeting, in relation to the Voyage of the <i>Polaris</i> , at the large hall of the Cooper Union. February 16, 1874.	93
III. The Oasis of Khiva: Ry J. A. MacGahan. Address of Gen. Sherman, U. S. Army, on the Caucasus. Letter from Eugene Schuyler, Secretary of Legation at St. Petersburg. February 26, 1874.	116
IV. Address of Hon. John M. Francis, on Greece as it is. March 10, 1874	138
V. Memorial Meeting on the Death of Dr. Livingstone. April 23, 1874. The Addresses	169
VI. Address of Dr. F. V. Hayden, U. S. Geologist. The Great West and the Scenery of our National Parks. April 15, 1874	196
VII. Address of Lieutenant Henry Clay Cochrane, U. S. Marine Corps. "Ascent of the Misti"	212
VIII. Addresses by Dr. Isaac I. Hayes, on Iceland, and Paul B. Du Chaillu, on Lapland. November 23, 1874.	227
IX. Western Exploration, by Lieut. George M. Wheeler, U. S. Corps of Engineers. December 23, 1874	233
X. Lieut. E. H. Ruffner, U. S. Corps of Engineers. Explorations of the Territories. (Communicated.)	253
XI. The New State of Colorado: By Alvan S. Southworth. March 30, 1875	260
XII. The White Nile and Ismail Pacha Ayoub. (Communicated.)	286
XIII. Livingstone's Nile: By A. I. Russell, C. E.	288
XIV. Prof. J. B. Steere. Formosa. (Communicated.)	302

ANNUAL REPORT
OF THE
AMERICAN GEOGRAPHICAL SOCIETY.

To the Honorable the Legislature of the State of New York:

In presenting the annual report of this Society, as required by the act of April 8, 1871, we beg leave to say that the charter, amended charter, organization, and general business, embracing a complete history of the Society's operations during 1874, will be found in the following pages. The papers which have been read before it, the contributions from explorers in distant lands, and the hearty coöperation of men of science, and all departments of the State and general government, are evidences of the usefulness as a public institution. At no time in its history has the Society enjoyed greater prosperity, and at no time has there been evinced a stronger desire on the part of the Fellows to realize in the highest degree the objects set forth in the charter.

(Signed)

CHAS. P. DALY,

President.

ALVAN S. SOUTHWORTH,

Recording Secretary.

CHARTER OF INCORPORATION.

GRANTED APRIL 13TH, 1854.

The People of the State of New York, represented in Senate and Assembly, do enact as follows :

SECTION 1. George Bancroft, Henry Grinnell, Francis L. Hawks, John C. Zimmerman, Archibald Russell, Joshua Leavitt, William C. H. Waddell, Ridley Watts, S. De Witt Bloodgood, M. Dudley Bean, Hiram Barney, Alexander J. Cotheal, Luther B. Wyman, John Jay, J. Calvin Smith, Henry V. Poor, Cambridge Livingston, Edmund Blunt, Alexander W. Bradford, and their associates, who are now or may become hereafter associated for the purposes of this act, are hereby constituted a body corporate by the name of The American Geographical and Statistical Society, for the purpose of collecting and diffusing geographical and statistical information.

§ 2. For the purposes aforesaid, the said Society shall possess the general powers and privileges, and be subject to the general liabilities, contained in the third title of the eighteenth chapter of the first part of the Revised Statutes, so far as the same may be applicable, and may not have been modified or repealed ; but the real and personal estate which the said Society shall be authorized to take, hold, and convey, over and above its library, and maps, charts, instruments, and collections, shall not at any time exceed an amount the clear yearly income of which shall be ten thousand dollars.

§ 3. The officers of the said Society shall be a president, three vice-presidents, a corresponding secretary, a recording secretary, a librarian, and treasurer, and such other officers as may from time to time be provided for by the by-laws of the said Society.

§ 4. The said Society, for fixing the terms of admission of its members, for the government of the same, for changing and altering the officers above named, and for the general regulation and management of its transactions and affairs, shall have power to form a code of by-laws, not inconsistent with the laws of this State, or

of the United States ; which code, when formed and adopted at a regular meeting, shall, until modified or rescinded, be equally binding as this act upon the said Society, its officers, and its members.

§ 5. The Legislature may at any time alter or repeal this act.

§ 6. This act to take effect immediately.

STATE OF NEW YORK, }
Secretary's Office, } ss.

I have compared the preceding with the original law on file in this office, and hereby certify the same to be a correct transcript therefrom, and of the whole of said original law.

Given under my hand and seal of office, at the city of Albany, this
[L. s.] thirteenth day of April, one thousand eight hundred and fifty-four.

A. G. JOHNSON.

Deputy Secretary of State.

AMENDED CHARTER.

PASSED APRIL 8TH, 1871.

STATE OF NEW YORK, NO. 237, IN SENATE, *March 7th*, 1871. — Introduced, with unanimous consent, by Mr. Bradley; read twice, and referred to the Committee on Literature; reported favorably from said committee, and committed to the Committee of the Whole.

CHAP. 373.

AN ACT in relation to The American Geographical and Statistical Society.

PASSED April 8th, 1871.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. The name or corporate title of the said Society shall hereafter be, The American Geographical Society of New York.

§ 2. The objects of the said Society shall be the advancement of geographical science; the collection, classification, and scientific arrangement of statistics, and their results; the encouragement of explorations for the more thorough knowledge of all parts of the North-American continent, and of other parts of the world which may be imperfectly known; the collection and diffusion of geographical, statistical, and scientific knowledge, by lectures, printed publications, or other means; the keeping-up of a correspondence with scientific and learned societies in every part of the world, for the collection and diffusion of information, and the interchange of books, charts, maps, public reports, documents, and valuable publications; the permanent establishment in the city of New York of an institution in which shall be collected, classified, and arranged, geographical and scientific works, voyages and travels, maps, charts, globes, instruments, documents, manuscripts, prints, engravings, or whatever else may be useful or necessary for supplying full, accurate, and reliable information in respect to every part of the globe, or explanatory of its geography, physical and descriptive; and its geological history, giving its climatology, its productions, animal, vegetable, and mineral; its exploration, navigation, and commerce;

having especial reference to that kind of information which should be collected, preserved, and be at all times accessible for public uses in a great maritime and commercial city.

§ 3. The power given by the act hereby accorded to the said Society, to take, hold, convey, manage, and make use of its real and personal estate, shall be understood as authorizing said Society to take and hold by gift, grant, bequest, devise, subject to all provisions of law relative to devises and bequests by last will and testament, or purchase real estate to the value of three hundred thousand dollars, and to invest its income or its personal estate generally so as to produce a regular annual income sufficient for the accomplishment of the purposes set forth in the first section of this act; but said annual income shall not exceed twenty-five thousand dollars annually.

§ 4. The said Society shall make an annual report of its proceedings to the Legislature.

STATE OF NEW YORK, }
Office of Secretary of State, } ss.

I have compared the preceding with the original law on file in this office, and do hereby certify that the same is a correct transcript therefrom, and of the whole of said original law.

Given under my hand and seal of office, at the city of Albany, this
[L. s.] twenty-second day of May, in the year one thousand eight hundred and seventy-one.

DIEDRICH WILLERS, JR.,

Deputy Secretary of State

BY-LAWS.

REVISED JANUARY 19TH, 1874.

CHAPTER I:

TITLE.

The title of the Society is "The American Geographical Society."

CHAPTER II.

OBJECTS.

The objects of the Society are "the collecting and diffusing of geographical and statistical information".

CHAPTER III.

MEMBERS.

1. The Society shall consist of Fellows; honorary, corresponding, and ex-officio members.

2. Honorary members shall be chosen on account of their distinction in the science of geography or statistics, and not more than twelve of them shall hereafter be elected in any one year.

3. Corresponding members shall be chosen from those who have aided the advancement of geography or statistics.

4. Ex-officio members shall be foreign diplomatic representatives and consuls, resident in the United States; and United States diplomatic representatives and consuls in foreign countries.

5. Fellows, and corresponding and honorary members, shall be elected as follows: All nominations of candidates shall be openly made in writing at a meeting of the Society, or the Council, by a

member thereof, and, together with the name of the member making them, entered on the minutes. The persons thus nominated, when approved by the Council and elected by the Society, shall, on payment of the initiation-fee, if nominated as Fellows, and without such payment if nominated as corresponding or honorary members, become members of the Society accordingly.

6. Persons entitled to become ex-officio members of the Society shall, on the recommendation of the Council, be, by the Society, constituted and declared to be such members.

7. The name of any member of the Society may, on the recommendation of the Council, and by a vote of two-thirds of the members present at a stated meeting of the Society, be dropped from the roll of its members.

CHAPTER IV.

INITIATION-FEE AND ANNUAL DUES.

1. The initiation-fee, including the dues for the current year, shall be, for a Fellow, ten dollars, to be paid immediately on election.

2. The annual dues thereafter shall be, for a Fellow, five dollars, to be paid in advance.

3. Any Fellow of the Society not in arrears may commute for life all dues for Fellowship by the payment at one time, if a Fellow, of one hundred dollars.

4. The name of any Fellow of the Society neglecting for two successive years to pay his annual dues, or at any time wholly refusing to pay them, may, by the Council, be erased from the list of Fellows of the Society.

5. The fiscal year of the Society shall, for all purposes, be the calendar year; that is, commence on the first day of January, and end with the thirty-first day of December, in each year.

CHAPTER V.

OFFICERS.

1. The officers of the Society shall be a president, three vice-presidents, a foreign corresponding secretary, a domestic corresponding secretary, a recording secretary, treasurer, and fifteen

councillors; and these officers, together, shall form the Council of the Society.

2. The officers of the Society shall be chosen from among its members; they shall be elected annually by ballot, and shall hold their offices respectively until others are elected in their places.

3. All officers of the Society, to be chosen at any election, may be voted for on one ballot.

CHAPTER VI.

ANNUAL MEETING.

1. The annual meeting of the Society shall be held on the second Tuesday after the first day of January in each year, and every year hereafter, when the annual election of the officers of the Society shall take place; and if, from any cause, there shall be a failure of the annual election at the time above designated for that purpose, the same may be held on the Tuesday next following; that is, on the third Tuesday after the first day of January in each year, and of which due notice shall be given.

2. Every member of the Society, who has been such for twenty days or more, and who is not in arrears for his dues for the past year, shall be entitled to vote at the said election.

3. At the annual meeting of the Society, the Council shall present a general report of its proceedings, and of those of the Society during the past year; and the Secretaries and Treasurer shall also present their annual reports.

CHAPTER VII.

MONTHLY AND SPECIAL MEETINGS.

1. The Society, unless otherwise specially ordered by the Society or the Council, shall hold its stated meetings for the transaction of business on the second Tuesday of each month of the year, except July, August, and September.

2. The President, or, in his absence, one of the Vice-Presidents, may, and, upon the written request of five members, shall, call a special meeting of the Society, by giving three days' notice thereof in two daily newspapers, published in the city of New York.

CHAPTER VIII.

ORDER OF BUSINESS.

1. At all stated meetings of the Society, for the transaction of ordinary business, the order of proceedings shall be as follows :

1. Reading of the minutes.
2. Reports and communications from officers of the Society.
3. Reports from the council.
4. Reports from committees.
5. Nominations of members.
6. Special orders.
7. Unfinished business.
8. Miscellaneous business.
9. Papers read and addresses delivered before the Society.

2. All propositions presented for the action of the Society, at any of its meetings, shall be in writing when requested by the presiding officer, or any member. A proposition thus presented, when seconded, and the question thereon stated from the chair, shall be deemed to be in the possession of the Society, and open for discussion, but may be withdrawn by the mover at any time before amendment or decision.

3. No member shall speak more than once upon the same question until all the other members present desiring to speak shall have spoken ; nor more than twice on any question without leave of the Society.

CHAPTER IX.

QUORUM.

At all meetings of the Society, nine members present shall constitute a quorum for the transaction of business.

CHAPTER X.

COMMITTEES.

All committees authorized by the Society shall, unless otherwise specially ordered, consist of three members each, and be appointed by the presiding officer.

CHAPTER XI.

PRESIDING OFFICER.

At all meetings of the Society, on the arrival of the appointed hour, and the presence of a quorum, the President, or, in his absence, one of the Vice-Presidents, or, in the absence of both, the Chairman *pro tem.*, shall immediately take the chair, call the meeting to order, and preside. He shall have only a casting vote. He shall preserve order and decide all questions of order, subject to an appeal to the Society. He shall also, unless otherwise specially ordered, appoint all committees authorized by the Society; and at every annual election, before the opening of the polls, he shall appoint two tellers of the election.

CHAPTER XII.

SECRETARIES.

1. Foreign Corresponding Secretary.—It shall be the duty of the Foreign Corresponding Secretary to conduct the general correspondence of the Society with individuals and associate bodies in foreign countries.

2. Domestic Corresponding Secretary.—It shall be the duty of the Domestic Corresponding Secretary to conduct the Society's general correspondence with individuals and associate bodies in the United States.

3. Both the Foreign and Domestic Secretaries shall keep, in suitable books to be provided for that purpose, at the Society's rooms, true copies of all letters written by them respectively on behalf of the Society; and shall preserve, on proper files, at the said rooms, all letters received by them on the same account; and at each stated meeting of the Society or the Council, they shall respectively report their correspondence, and read the same, or such parts thereof as may be required.

4. In case of a vacancy in the office of either of the Corresponding Secretaries, or in the absence or disability of either of these officers, the duties of both may be performed by the other Corresponding Secretary.

5. The Society may designate a particular officer, or appoint a committee, to prepare a letter or letters on any special occasion.

6. Recording Secretary.—It shall be the duty of the Recording Secretary to give due notice of the time and place of all meetings of the Society, and to attend the same. He shall keep fair and accurate minutes of the proceedings of the Society, and record the same, when approved, in the Society's Journal. He shall give immediate notice to the several officers and committees of the Society of all votes, orders, resolves, and proceedings of the Society affecting them, or appertaining to their respective duties. He shall prepare a list of the members of the Society entitled to vote, to be handed to the Tellers before the opening of the polls at each annual election. He shall officially sign and affix the corporate seal of the Society to all diplomas, and other instruments or documents authorized by the Society or Council. He shall have charge of the corporate seal, charter, by-laws, records, and general archives of the Society, except so far as they may be expressly placed under the charge of others. He shall certify all acts and proceedings of the Society, and shall notify the Council of the death, resignation, or removal of any officer or member of the Society. He shall have charge of the rooms of the Society, and shall perform all such other and further duties as may, from time to time, be devolved upon him by the Society or the Council. He shall receive, for his services, such salary or pecuniary compensation as shall be determined by the Society or the Council; but neither in the Society nor the Council shall he have a vote on any question relating to, or affecting, his salary or pecuniary compensation. He, together with the Council, shall have the charge and arrangement of the books, maps, and collections belonging to the Society. He shall cause to be kept in the rooms of the Society a registry of all donations to the library or collections of the Society, acknowledge their receipt by letter to the donors, and report the same, in writing, to the Society at its next stated meeting.

7. All documents relating to the Society, and under the charge of the Secretaries respectively, shall be placed in such depositories in the rooms of the Society as the Council may provide and designate for that purpose.

CHAPTER XIII.

TREASURER.

The Treasurer shall have charge of, and safely keep, all contracts, certificates of stock, securities, and muniments of title belonging to the Society. He shall collect the dues and keep the funds of the Society, and disburse the same under the direction of the Council; and so often as the said funds in the hands of the Treasurer shall amount to one hundred dollars he shall deposit the same, in the name of the Society, in some incorporated bank in the city of New York, to be designated for that purpose by the Council; and the said funds, thus deposited, shall be drawn out of the said bank on the check of the Treasurer, countersigned by the Chairman of the Council, and only for the legitimate and authorized purposes of the Society. The Treasurer shall, previous to the annual meeting of the Society, prepare and submit to the Council, for audit, a detailed account of his receipts and disbursements for account of the Society during the past year; which annual account, duly audited, he shall present, with his general report, to the Society, at its annual meeting.

CHAPTER XIV.

COUNCIL.

1. The Council shall have the management and control of the affairs, property, and funds of the Society; and shall designate an incorporated bank in the city of New York where the said funds shall, from time to time, as they accrue, be deposited by the Treasurer.

2. It may frame its own by-laws not inconsistent with the charter or by-laws of the Society.

3. It may, from time to time, determine the salary or pecuniary compensation of the Recording Secretary; and shall also appoint the necessary agents, clerks, and servants of the Society, with such powers, duties, privileges, and compensation as it may, from time to time, determine; and may, at pleasure, revoke such appointments, and make others in their stead.

4. It shall have power to fill, for the unexpired term, any vacancy that may occur in any of the offices of the Society.

5. It shall have power, at its discretion, to declare vacant the seat of any member of its own body (except the President and Vice-Presidents) who shall have been absent from its meetings for three successive months; and also, by a vote of a majority of the whole Council, to remove, from its own body, any member thereof for cause; but in such case it shall be the duty of the Council to report every such vacancy or removal to the Society, at its next stated meeting thereafter, when such cases shall be subject to review by the Society.

6. It shall not without an approving vote of the Society, at a stated meeting thereof, make any contract whereby a liability in amount above one thousand dollars may be incurred by the Society, nor, without such vote, make any sale or disposition of the property of the Society, exceeding that sum in value.

7. The Council may, in its discretion, remit the initiation-fee or annual dues of any member of the Society.

8. No member of the Council, except the Recording Secretary, shall receive any salary or pecuniary compensation for his services.

9. The Council shall hold stated meetings for the transaction of business, at least once in every month, except the months of July, August, and September.

10. At all meetings of the Council five members present shall constitute a quorum for the transaction of business.

CHAPTER XV.

GENERAL PROVISION AS TO DEBT.

No debt on account of the Society, beyond the funds in the treasury for its payment, shall, for any purpose, at any time, be incurred; and if, at any time, it shall appear that there are resting upon the Society pecuniary obligations beyond the funds in the treasury for their liquidation, no appropriation of funds from the treasury whatever, except for the necessary current expenses of the

Society, shall be made, until the said pecuniary obligations shall have been fully discharged, or the funds necessary for their extinction shall have been set apart for that purpose.

CHAPTER XVI.

ALTERATION OF THE BY-LAWS.

No alteration in the by-laws of the Society shall be made unless openly proposed at a stated meeting of the Society, entered on the minutes with the name of the member proposing the same, and adopted by the Society at a subsequent stated meeting by a vote of two-thirds of the members present.

CHAPTER XVII.

ADOPTION OF THE BY-LAWS.

The foregoing are hereby adopted and declared to be the by-laws of the Society; and all by-laws of the Society heretofore adopted are hereby rescinded, and declared to be null and void.

HONORARY AND CORRESPONDING MEMBERS, AND FELLOWS.

HONORARY MEMBERS.

- BAKER, SIR SAMUEL WHITE, Pasha, F. R. S., London, England.
BAKER, LADY, London, England.
His Imperial Highness, the Grand-Duke CONSTANTINE, of Russia,
President of the Imperial Geographical Society, St. Petersburg,
Russia.
ISMAIL, H. I. M., Pasha, Khedive, of Egypt.
LAYARD, AUSTIN HENRY, D. C. L., London, England.
MARKHAM, CLEMENTS R., C. B., Secretary of the Royal Geographical
Society, London, England.
MCCLINTOCK, FRANCIS LEOPOLD, LL. D., London, England.
MIDDENDORFF, ADOLPH THEODORE VON, Secretary of the Imperial
Academy of Sciences of Russia, St. Petersburg.
PETERMANN, Prof. AUGUSTUS, PH. D., Gotha, Germany.
RAWLINSON, SIR HENRY CRESWICKE, D. C. L., London, England.
STRUVE, OTTO WILHELM VON, St. Petersburg, Russia.
WILCZEK, Count H., Vienna, Austria.
-

CORRESPONDING MEMBERS.

- ABBE, Prof., Cleveland, Washington, D. C.
ALVORD, Gen. BENJAMIN, U. S. A., Washington, D. C.
ALTAMIRANO, Señor DON IGNACIO, Mexico.
AMMEN, Com. DANIEL, U. S. N.
BAKER, Com. F. H., U. S. N., Norfolk, Va.
BARANDA, Señor JOAQUIN, Mexico.
BARCLAY, JAMES T., M. D., Jerusalem, Syria.
BARNARD, HENRY, LL. D., Hartford, Conn.
BARTLETT, JNO. RUSSELL, Providence, R. I.
BASTIAN, Dr. A., Berlin.
BECKER, M. A., Vienna.

- BEHM, Dr. E., Gotha.
BEEBE, C. G., Shanghae, China.
BOUDINOT, Col. E. C., Venita, Cherokee Nation.
BRAINE, Commander, D. L., U. S. N.
BRIGHT, JOHN, M. P., London, England.
BUSHNELL, ALBERT (Rev.), Gaboon, Equatorial Africa.
CARLOS, Señor DON JOSE, Washington, D. C.
CHAIX, Prof. PAUL, Geneva, Switzerland.
CIEROL, Señor MANUEL, Mexico.
CHANDLESS, W., F. R. G. S., London, England.
COLLINS, Lieut. FRED., U. S. N., Annapolis, Md.
DEHAASS, Rev. F. S., U. S. Consul, Jerusalem.
DAVIS, THOMAS E., Rome.
DOW, Captain J. M., Panama, C. A.
DRAPER, LYMAN, Madison, Wis.
DUNCAN, WILLIAM H., Hanover, N. H. .
EMORY, Gen. WM. H., U. S. A., Washington, D. C.
FOETTERLE, FRANZ, late Secretary of the Imperial Geographical Society of Vienna, Austria.
FRITSCH, HUGO O., New York.
GARDNER, J. T., New York.
GIBBS, DOUGLASS, Alexandria, Egypt.
GILMAN, DANIEL COIT, LL. D., Baltimore, Md.
GUYOT, Prof. ARNOLD HENRY, LL. D., Princeton, N. J.
HAGUE, J. D., Washington, D. C.
HANCOCK, WILLIAM NEILSON, LL. D., Dublin, Ireland.
HAYDEN, Prof. F. V., Washington, D. C.
HANSELL, HERR, Khartoum.
HEFTA, THOMAS J., Consul, Christiania.
HELLWALD, FRIEDRICH VON, Member of the Imperial Royal Geographical Society, Vienna, Austria.
HITCHCOCK, C. H., PH. D., Hanover, N. H.
HOCHSTETTER, Dr. FERDINAND VON, Professor in the University of Vienna, Austria.
HOSMER, Dr. GEO. W.
HOUGH, FRANKLIN B., M. D.
HUMPHREYS, Gen. A. A., U. S. A., Washington, D. C.
HUNT, Prof. T. STERRY, LL. D., Boston.
JACKSON, JOHN P., Berlin.
KIRKHAM, Gen., Adowa, Abyssinia.
KING, CLARENCE C. E., New York.
LAPHAM, I. A., Milwaukee, Wis.
LAMANSKY, EUGENE VON, St. Petersburg, Russia.
LESSEPS, FERDINAND DE, Suez, Egypt.

- LONG, STEPHEN H., U. S. A., Louisville, Ky.
LUCE, Captain S. B., U. S. N.
LULL, Com., E. P., U. S. N., Newport, R. I.
MCCARTEE, DIVIE BETHUNE, M. D., Hong Kong, China.
MCLEAN, WM. J., Bombay, India.
MALTE BRUN, V. A., Honorary Secretary of the Geographical Society,
Paris, France.
MARISCAL, Señor DON IGNACIO, Mexico.
MARSH, Hon. GEORGE P., LL. D., U. S. Minister, Rome, Italy.
MARTIN, Rev. WM. A. P., D. D., Professor of the Imperial College, at
Pekin, China.
MAURY, LOUIS FERDINAND ALFRED, Paris, France.
MAUNOIR, CHARLES, Paris.
NAPRSTEK, VOJTA, Prague, Austria.
NASSAU, Rev. R. H., Gaboon, Africa.
NEGRI, CRISTOFORO, Late President Italian Geographical Society,
Consul General of Italy, Hamburg.
NEWMARCH, WM. Hon., Sec. of the Statistical Society of London,
England.
NORDENSKJOLD, Prof. A. E., Stockholm.
PALAZIOS, Gen. VINCENTE, Riva, Mexico.
PARDO, Señor DON EMILIO, Mexico.
PACHA, ISMAIL, Governor General of the Soudan.
PAYNO, Señor DON MANUEL, Mexico.
PERKINS, E. H.
PENNA, Señor TERREIRA, Para, Brazil.
PINHEIRO, J. C. FERNANDES, M. D., Brazil.
PIMENTIL, D. JOAQUIN XAVIER DE OLIVERIA, Satarem Para, Brazil.
POESCHE, THEODORE, Washington, D. C.
RAE, JOHN, M. D., Hamilton, Canada.
RAYMOND, Capt. CHARLES W., U. S. A., West Point, N. Y.
RIO DE LA LOZA, Señor DON LEOPOLDO, Mexico.
ROBERTS, Gen. W. M., New York.
ROMERO, MATHIAS, Mexico.
ROGERS, Rear Admiral JOHN, U. S. N.
ROTHROCK, Dr. J. T., Wilkesbarre, Pennsylvania.
SAINT-MARTIN, VIVIEN DE, Paris.
SAUER, GEORGE, Paris.
SAPUCACHY, M. LE VISCOMTE, Rio Janeiro, Brazil.
SCHADE, LOUIS, M. D., Washington, D. C.
SCHLAGINTWEIT-SAKÜNLÜNSKI, ROBERT VON, Giessen, Germany.
SCHLAGINTWEIT-SAKÜNLÜNSKI, HERMANN VON, Munich, Germany.
SHUMACHER, Dr., Consul General, New York.

SCHUYLER, EUGENE, St. Petersburg, Russia.
 SCHUMACHER, JOHN, Altona, Germany.
 SELFIDGE, Com. T. O., U. S. N., Washington, D. C.
 SEYMOUR, HORATIO, LL. D., Utica, N. Y.
 SIMMONS, D. B., M. D., Yeddo, Japan.
 STANLEY, HENRY M., Ashantee.
 STARRING, Gen. F. A., Paris.
 STEVENS HENRY, London, England.
 STEERE, J. B., U. S. Consul, Hong Kong, China.
 TAINTOR, EDWARD C., Shanghae, China.
 TEJADO, DON SEBASTIAN LERDO DE, Mexico.
 VAN BENTHUYSEN, CHARLES, Albany, N. Y.
 WHEELER, Lieut. G. M., U. S. A., Washington, D. C.
 WILLIAMS, S. WELLS, U. S. Legation, Pekin, China.
 WYMAN, Capt. R. H., U. S. N., Washington, D. C.

FELLOWS.

* L. F. Life Fellows.

Abbe, George W.,	Aitken, William B.,	Andrews, George H.,
Abbett, Leon.,	Albert, Halpern,	Andrews, Rufus F.,
Abbot, James L.,	Alexander, Chas. B.,	Anthony, Edward,
Abbott, Charles A.,	Alexander, Junius B.,	Apgar, Louis J.,
Abbott, Josiah H.,	Allen, Horatio M.,	Appleton William H.,
Aborn, Robert W.,	Allen, Henry W.,	Appleton John A.,
Acker, David D.,	Alexander, James A.,	Appleton, D. S.,
Acton, Thomas C.,	Allen, Jerome,	Appleton, George S.,
Adams, Chas. Francis,	Allen, Thomas,	Arden, Thomas B.,
Adams, John P.,	Alliger, Elijah,	Arnold, Dan. H. (L. F.),
Adams, Russell W.,	Alsop, Joseph W.,	Arnold, Gustavus,
Adams, William,	Amend, Bernhard G.,	Arnold, Richard,
Adler, Felix,	Amidon, Francis H.,	Arnoux, William H.,
Adriance, John,	Amory, Arthur,	Arthur, Chester A.,
Agnew, Alex. Mc L.,	Amy, Henry,	Asch, Joseph J.,
Agnew, Jno. T. (L. F.),	Anderson, Henry H.,	Ascher, Adolph,
Aguiar, A. W. F. de,	Anderson, Henry F.,	Asher, John R.,
Aitken, John,	Anderson, John H.,	Aspinwall, Lloyd,
Aikman, Samuel M.,	Anderson, John F., Jr.,	Astor, W. W.,

Atkinson, William H.,	Barton, Samuel,	Blodgett, Daniel C.,
Atterbury, W. W.,	Bartow, Morey H.,	Blodgett, William T.,
Auchincloss, Henry B.,	Bates, Levi M.,	Blood, Henry,
Auchmuty, Rich'd T.,	Bayne, Lawrence P.,	Blood, O. Howard,
Auerman, August.,	Beach, William A.,	Bloomfield, William,
Avery, Samuel P.,	Beach, Henry N.,	Blumensteil, Alex.,
Aymar William (L. F.),	Beardslee, Rufus G.,	Blumenthal, Joseph,
Backus, Henry C.,	Beardslee, J. B.,	Boardman, Andrew,
Bacharach, Herman,	Beckwith, N. M.,	Boardman, Norman S.
Bailey, N. P.,	Beecher, Henry Ward,	Body, John E.,
Bailey, James M.,	Beebe, Welcome R.,	Boese, Charles,
Baker, Orville R.,	Beekman, James W.,	Bogart, Orlando M.,
Baker, Peter C.,	Belding, Milo M.,	Bookstaver, Henry A.,
Baker, James, Jr.,	Bell, Richard,	Bolton, Henry C.,
Baker, H. J.,	Bell, Isaac,	Bonn, William B.,
Baker, Francis,	Bell, George,	Bond, T. Edward,
Baldwin, Towns'd B.,	Bell, Clark,	Bonner, Robert,
Baldwin, N. A.,	Belmont, A. (L. F.),	Boorman, J. M.,
Baldwin, James M.,	Bellows, Henry W.,	Booth, William A.,
Ballin, Eugene S.,	Benedict, Erastus C.,	Booth, Robert R.,
Ball, Thomas L.,	Bennett, Jas. Gordon,	Booth, William T.,
Ball, Henry,	Benjamin, John,	Botta, Vincenzo,
Bancroft, Geo. (L. F.),	Bentley, Andrew J.,	Bouck, C. W.,
Banks, David,	Bernheimer, Adolph.,	Bowers, Arthur F.,
Banvard, John,	Bernheimer, Isaac,	Bradford, James F.,
Banyer, Goldsboro,	Bernheimer, Leopold,	Bradford, William,
Barbour, Thomas,	Bernheimer, Simon,	Bradley, Miles,
Barbey, A. H.,	Betts, William,	Brady, John R.,
Bard, Charles,	Berry, Richard,	Braker, Conrad, Jr.,
Barlow, S. L. M.,	Bibby, Edward A.,	Breese, K. R.,
Barling, Henry A.,	Bibby, W. H.,	Breevort, J. Carson,
Barnard, F. A. P.,	Bickmore, Albert S.,	Bridgham, S. W.,
Barnard, Horace,	Bien, Julius,	Brooks, Elisha,
Barney, Hiram (L. F.),	Bierstadt, Albert,	Brooks, Sidney,
Barney, Newcomb C.,	Bill, Edward,	Brown, Charles S.,
Barnes, Oliver W.,	Birdseye, Lucien,	Brown, James (L. F.),
Barnes, John S.,	Bishop, D. W. (L. F.),	Brown, Henry R.,
Barrow, John W.,	Bishop, T. A. (L. F.),	Brown, James M.,
Barron, Thomas,	Bissinger, Philip,	Brown, Stewart,
Barril, John J.,	Bjerring, Nicholas,	Brown, Walston H.,
Barrett, William C.,	Black, William,	Brownson, W. H.,
Barr, William,	Blake, Charles F.,	Bryant, Wm. Cullen,
Bartlett, Willard,	Bleecker, Anthony J.,	Bryce, James (L. F.),
Bartlett, Edward T.,	Bleecker, T. B., Jr.,	Buckley, James M.,

Burton, Charles W.,	Chittenden, S. B.,	Coster, G. W.,
Butler, Benjamin F.,	Choate, William G.,	Cottenet, Francis,
Butler, Charles,	Christern, F. W.,	Coughtry, W. B.,
Butler, Cyrus,	Church, George E.,	Coulter, Samuel,
Butler, William A.,	Churchill, Franklin H.,	Courtright, Milton,
Butterfield, Daniel,	Cisco, John J.,	Coutan, Charles E.,
Byrd, George J.,	Clark, E. V.,	Cowdin, Eliot C.,
Cable, George W.,	Clark, Lot Curran,	Cowdrey, N. A.,
Cabot, Stephen,	Clark, Luther C.,	Cowles, Walter S.,
Caleb, Madison M.,	Clerke, Wm. B.,	Cox, Samuel S.,
Camblos, Henry S.,	Clews, Henry,	Cox, James Farley,
Cammann, H. H.,	Cloyd, James C.,	Crain, Durham Jones,
Cammann, Henry J.,	Coates, Isaac T.,	Crane, Walworth D.,
Campbell, Allen,	Cochrane, Henry C.,	Crawford, S. W.,
Campbell, Howard,	Cockroft, Jacob H. V.,	Crerar, John,
Carhart, Thomas F.,	Coffin, C. C.,	Crocker, Wm. Baylies,
Carr, David,	Cogswell, William L.,	Crocker, George A.,
Carter, James C.,	Cohn, Leopold,	Crocker, David,
Carter, Oliver S.,	Colgate, Charles C.,	Crooks, Ramsay,
Carter, Robert,	Colgate, James B.,	Crosby, J. Schnyler,
Carter, Walter S.,	Colgate, Robert,	Crosby, John P.,
Cary, Wm. F. (L. F.),	Colton, Jos. H. (L. F.),	Crosby, Hiram B.,
Cary, Lucius E.,	Comstock, Cornelius,	Cruikshank, James,
Case, Alfred L.,	Conger, Abraham B.,	Cruikshank, Edwin A.,
Case, Robert L.,	Conger, Clarence B.,	Cushing, Caleb,
Casey, Joseph J.,	Conklin, Eugene E.,	Cullum, G. W. (L. F.),
Casserly, Bernard,	Conklin, William A.,	Curphey, James,
Caswell, William H.,	Conkling, F. A. (L. F.),	Curren, Robert,
Catlin, Julius F.,	Connery, T. B.,	Currie, Gilbert E.,
Catlin, N. W. S. (L. F.),	Conover, John T.,	Curtis, William E.,
Caylus, Ernest,	Constable, James M.,	Curtis, Lewis,
Ceballos, J. M.,	Constantine, A. J.,	Curtis, Joseph R.,
Chapin, E. H.,	Constantine, John,	Daly, Charles P.,
Chapman, Henry G.,	Conyngham, Wm. I.,	Daly, Augustin,
Chapman, Joseph H.,	Cooley, Jas. E. (L. F.),	Daly, Joseph F.,
Chase, Leslie,	Cooper, Edward,	Dalrymple, Alexander,
Chatellier, Joseph F.,	Cooper, Peter,	Dana, Charles A.,
Chatfield, Cyrus H.,	Cooper, Philip H.,	Dana, William B.,
Chatillon, John P.,	Cooper, Stephen V. R.,	Dancker, Charles,
Chauncey, Frederick,	Corning, Erastus,	Dane, Francis,
Chauncey, Henry,	Corse, Israel,	Dane, H. C.,
Chickering, Charles F.,	Cossitt, Frederick H.,	Darling, William A.,
Chickering, George H.,	Coster, Charles H.,	Dash, John B.,

Davenport, James B.,	Ditson, Oliver,	Eaton, John,
Davidson, Stratford P.,	Dix, John A.,	Eaton, D. Cady,
Davies, Henry E.,	Dixon, William P.,	Eaton, Sherburne B.,
Davison, Edward F.,	Dodge, Edward,	Edey, Charles C.,
Davis, Alexander J.,	Dodge, Robert,	Edwards, Jonathan,
Davis, Noah,	Dodge, Wm. E.,	Egbert, Milton C.,
Davis, John H.,	Dodge, Wm. E., Jr.,	Egleston, Henry P.,
Davis, John G.,	Donohue, Charles,	Eidlitz, Marc,
Davis, Samuel D.,	Donnell, Robert W.,	Ellinger, Moritz,
Dawson, H. B.,	Doolittle, Edwin A.,	Elliott, Andrew Foster,
Dayton, Jesse C.,	Doremus, R. Ogden,	Ellwell, Charles F.,
Dean, Thompson,	Douglass, Andrew E.,	Ely, D. J.,
De Castro, Diego,	Dow, John E., Jr.,	Emmet, Thomas Addis,
Defendorf, Wilson,	Dowd, William,	Emott, James,
Decker, Charles A.,	Dowley, John,	Endicott, Francis,
Decker, John J.,	Downer, Samuel,	Entwisle, Edward,
De Costa, B. F.,	Drake, William T.,	Ernst, C. W.,
De lafield, M. L.,	Drap-r, Frank E.,	Evarts, William M.,
Delamater, Cornel's A.,	Driggs, Marshall S.,	Evans, Walton W.,
Delmonico, L.,	Drone, Eaton S.,	Ewen, John, Jr.,
Del Monte, Leonardo,	Drowne, Henry T.,	Eyre, Henry S. P.,
De Lancey, Edward F.,	Dryfoos, Louis,	Fabbri, Egisto P.,
Delano, Franklin H.,	Duane, Martin H.,	Fabbri, Ernesto G.,
Deming, W. H.,	Du Bois, William A.,	Fabian, Robert L.,
Dennis, Chas. (L. F.),	Du Chaillu, Paul B.,	Faile, Thomas H.,
Denny, Charles A.,	Dudley, J. G.,	Fairfield, Walter S.,
Denny, John T.,	Dufais, Ferdinand F.,	Fairchild, Egbert H.,
Denny, Thomas, Jr.,	Duke, John H.,	Fairbanks, Franklin,
De Peyster, Fred. (L.F.),	Dun, R. G.,	Falconer, Nathaniel B.,
De Peyster, J. W. (L.F.),	Duncan, Wm. Butler,	Fanshawe, Henry A.,
Detmold, Christian E.,	Dunscomb, Rich'd T.,	Farragut, Loyall,
Detmold, William,	Dunshee, Henry W.,	Fargo, William G.,
Devlin, Jeremiah,	Durant, Thomas C.,	Farrell, Thomas M.,
De Voe, Thomas F.,	Duryee, Abram,	Fatman, Lewis,
Dewey, William C.,	Dutilh, E.	Farnham, Charles H.,
Dewing, Charles H.,	Dwight, James F.,	Fellows, John P.,
De Witt, John E.,	Dwight, Timothy T.,	Fenton, S., Jr.,
Deyo, R. E.,	Dwight, Theodore W.,	Fenton, D. W.,
Dickerson, E. N.,	Duyckinck, Evert A.,	Fernbach, Henry,
Diefendorf, Menzo,	Eakin, Henry E.,	Ferry, George J.,
Diggs, D. William,	Eakin, Thomas,	Feuchtwanger, Meyer.
Dillon, Romaine (L.F.),	Eastman, Albert E.,	Feust, Sigismund,
Dinsmore, Wm. B.,	Eaton, Dorman B.,	Field, Dudley,

Field, E. G.,	Frohwein, Theobald,	Goldman, Marcus,
Field, H. M.,	Frothingham, O. B.,	Goldsmith, Jacob,
Field, H. W. (L. F.),	Fry, Horace B.,	Gomez, Raphael M.,
Field, Cyrus W. (L. F.),	Fry, James B.,	Goodsell, James H.,
Fish, Hamilton,	Furnald, F. P., Jr.,	Gordon, James,
Field, David Dudley,	Funch, Christian F.,	Gorton, Edwin G.,
Field, Charles M.,	Furniss, William,	Gottsberger, Wm. S.,
Field, B. H. (L. F.),	Gabb, Wm. M.,	Goulding, B. L.,
Fisk, Harvey,	Gage, W. L.,	Gouge, Henry A.,
Fiske, Arthur D.,	Galpen, Horace,	Graham, R. M. C.,
Fithian, Freeman J.,	Gambrill, C. D.,	Graham, C. K.,
Fleet, Oliver S.,	Gamewell, John N.,	Graham, Jas. L. (L. F.),
Fliess, William M.,	Garbutt, Elmer H.,	Grain, Francis H.,
Flint, Thompson J. S.,	Gardner, A. K.,	Gray, Frank A.,
Floyd, Edward E.,	Gardner, Hugh,	Gray, William H.,
Foerster, William,	Garland, John R.,	Gray, Joseph H.,
Fogg, Wm. H. (L. F.),	Garner, Wm. T.,	Gray, Horace,
Ford, John B.,	Gawtry, Harrison E.,	Green, Andrew H.,
Forman, Alexander,	Garwin, Samuel B.,	Greene, G. S.,
Foos, Lamar,	Gay, Harvey S.,	Greenwood, Isaac J.,
Foster, George J.,	Gaylor, Charles,	Greene, John W. (L. F.),
Foster, John A.,	Gebhard, W. H. (L. F.),	Greenebaum, David S.,
Foster, William R.,	Gedney, Fred'k G.,	Green, John,
Forster, George H.,	Geissenhainer, F. W., Jr.,	Greenleaf, Aug. W.,
Forsyth, John,	Gerard, James W., Jr.,	Grinnell, Moses H.,
Foshay, James W.,	Gerry, E. T. (L. F.),	Grinnell, Robert M.,
Foster, J. P. G.,	Gescheidt, Louis A.,	Griswold, James C.,
Foulke, Joseph,	Gibbs, Theodore K.,	Griswold, B. W.,
Foulke, Wm. D.,	Gibbs, Wolcott,	Griswold, Geo. (L. F.),
Fougera, Edmund C.,	Gilbert, Fred. E.,	Groom, Wallace P.,
Fowler, James D.,	Gilbert, Clinton,	Guernsey, Egbert,
Fowler, Edward P.,	Gilman, William C.,	Gurley, Henry,
Fox, Austen G.,	Gilman, Charles F.,	Gunther, Charles G.,
Fox, Baldwin N.,	Gilmore, Q. A.,	Gunther, William H.,
Frame, Charles P.,	Gillett, Daniel W.,	Gunther, F. F.,
Francis, John M.,	Gillespie, Edward C.,	Guth, John,
Francis, Lewis,	Gilsey, Peter,	Hadden, J. A. (L. F.),
Francklyn, C. G.,	Gitterman, Henry,	Haight, Charles C.,
Fraser, James,	Glaubenskle, Teo. G.,	Haight, Edward, Jr.,
Freeman, Pliny,	Gleason, F. L.,	Haines, John P.,
Freedman, John J.,	Gleason, Wesley,	Haldeman, S. S.,
French, Isaac V.,	Goadby, Wm. H.,	Hallgarten, Adolphus,
Friedman, Arnold,	Goadby, James H.,	Hallgarten, Charles L.,
Frith, Edward,	Godon, Sylvanus,	Hall, A. Oakey,

Hall, Elial F.	Hay, John,	Hutchings, Robert C.,
Hallock, Mrs. Francis,	Hazard, Rowland R.,	Hunter, Edward,
Halsted, Wm. M.,	Hegeman, William,	Hutton, Lawrence,
Hamersley, L.C. (L.F.),	Hegeman, Wm. A. O.,	Huntington, C. P.,
Hamersley, A.G. (L.F.),	Helmuth, Wm. T.,	Hunter, Charles F.,
Hamersley, J.W. (L.F.),	Henderson, John C.,	Hunter, John W.,
Hamilton, Alex., Jr.,	Hendricks, M. M.,	Hunter, James,
Ham, John C.,	Hendricks, Joshua,	Huntington, Daniel,
Hammond, Henry B.,	Hendricks, Edmund,	Hurlbut, H. A. (L. F.),
Hampton, Elwood,	Herring, Silas C.,	Hutton, Benjamin H.,
Hancock, Winfield S.,	Herring, Frank O.,	Hyde, Samuel T.,
Hand, Clifford A.,	Hess, Julius,	Ingalls, Rufus,
Hand, Robert N.,	Hewitt, Abram S.,	Ingersoll, Charles D.,
Harbison, Edward,	Heydecker, Edw. B.,	Inman, Wm. H.,
Harbeck, John H.,	Higgins, E. S.,	Ireland, John B.,
Harper, Fletcher,	Hill, John L.,	Isaacs, Isaac S.,
Harper, Nathan,	Hitchcock, Roswell D.,	Isaacs, Myer S.,
Harrison, Burton N.,	Hitch, Henry F.,	Iselin, William E.,
Harris, T. (L. F.),	Hoe, Peter S.,	Iselin, Adrian, Jr.,
Harris, R. Duncan,	Hoe, Richard M.,	Ives, Dotius D.,
Harris, Elisha,	Hoffman, Wm. B.,	Ives, Frederick E.,
Hartt, Charles F.,	Hodges, M. F.,	Jacob, Ephraim A.,
Hascall, William S.,	Hoguet, Henry L.,	Jackson, H. A.,
Hastings, George S.,	Hoguet, Robert J.,	Jackson, Chas. Carroll,
Hatch, Walter F.,	Holbrook, M. L.,	Jackson, James F.,
Hatch, Roswell D.,	Holbrook, E. W.,	Jackson, Fred'k W.,
Hatch, Rufus,	Holbrook, E. F.,	Jacquelin, John H.,
Hatch, Daniel B.,	Holbrook, Levi,	Jaffray, Edward S.,
Havemeyer, James,	Holcombe, Wm. F.,	Jaffray, Robert,
Havemeyer, Hector C.,	Holmes, Wm. H.,	James, Fred'k P.,
Havemeyer, J.C. (L.F.),	Holton, D. P. (L. F.),	James, D. Willis,
Havemeyer, Theo. A.,	Hoppin, W. W., Jr.,	Jameson, Joseph A.,
Havens, Charles G.,	Hoppin, Wm. J.,	Janssen, Gerhard,
Hawes, James W.,	Howard, John R.,	Jarvis, Nathaniel, Jr.,
Hawes, A. C.,	Hoyt, J. Q.,	Jarvis, Robert M.,
Hawkes, W. Wright,	Hoyt, David,	Jay, John (L. F.),
Hawk, Samuel,	Hoyt, Oliver,	Jenkins, Wm. L.,
Hawkins, Dexter A.,	Hoyt, Harlow M.,	Jenkins, Thos. W.,
Hawkins, Wm. F.,	Hughes, John,	Jesup, M. K.,
Hawley, E. Judson,	Hurlbert, Wm. H.,	Jewett, George W.,
Haydock, George G.,	Hull, C. W.,	Joachimsmen, Joseph P.,
Haydock, Robert,	Hull, Amos G.,	Johnson, Henry W.,
Hayes, Isaac I.,	Hunt, Wilson G.,	Johnson, Henry J.,
Hay, Allan,	Hutchins, Waldo,	Johnson, Hezron A.,

Johnson, Bradish,	Kidder, William F.,	Latting, John J.,
Johnson, William M.,	Kidder, Henry P.,	Lauterbach, Edward,
Johnston, John T.,	Kiddoo, J. B.,	Lawrence, J. S., (L. F.)
Johnston, James B.,	Kimball, Charles H.,	Lawrence, A. R.,
Johnston, Melville M.,	King, Oliver K.,	Lawrence, Joseph B.,
Jones, John D., (L. F.)	King, George,	Lawrence, E. H.,
Jones, Walter R. T.,	King, Lewis,	Lawrence, Alex. C.,
Jones, Charles C., Jr.,	King, Edward, (2.)	Lawrence, Samuel B.,
Jones, Edward A.,	King, David,	Lawton, Walter E.,
Jones, John Q.,	King, Edward, (1.)	Lea, Joseph,
Jones, Lewis C.,	Kingsland, A. C.,	Leaman, Walter K.,
Jones, George,	Kingsland, Wm. M.,	Leary, Arthur,
Jordan, Conrad N.,	Kirkland, Charles P.,	Leavenworth, E. W.,
Jordan, Edward,	Kip, Lawrence,	LeComte, Joseph,
Jova, John J.,	Kitchen, William K.,	Lederle, Joseph,
Joy, Charles A.,	Kitching, Robert N.,	Lee, Ambrose,
Judah, Samuel B. F.,	Kitchen, James,	Lefferts, Marshall,
Judd, Hophni,	Kerchies, Alex. F.,	Leggat, Andrew R.,
Judson, William D.,	Klamroth, Albert,	Leggett, Francis W.,
Kalbfleisch, Chas. H.,	Koch, Joseph,	Lehmair, M. H.,
Kane, J. Grenville,	Knapp, Gideon L.,	LeMoyne, E. M.,
Kato, George P.,	Knoedler, Julius,	Lenox, James,
Kauffman, Samuel,	Knower, John,	Lent, DeWitt C.,
Kauffman, Sigismund,	Krackowizer, E.,	Leonard, William H.,
Kayser, Julius,	Kunhardt, Henry R.,	Leshner, Stephen R.,
Kearny, Edward,	Kühne, Frederick,	Leslie, Frank,
Kearny, Joseph R.,	Lacey, Richard,	Letson, Robert S.,
Keck, Thomas,	Landman, Max.,	Levine, Joseph,
Keese, Samuel T.,	Landon, Charles G.,	Leuthner, Frederick,
Kelly, J. D. J.,	Lane, Smith E., (L. F.)	Levino, Alexander M.,
Kelly, Eugene,	Lane, George W.,	Lewis, Walter H.,
Kemble, Gouv. N.,	Langdon, W., (L. F.)	Libbey, William, (L. F.)
Kemp, John H.,	Langdon, Woodbury,	Lincoln, James D.,
Kemp, William,	Lanier, J. F. D.,	Littlejohn, DeWitt C.,
Kendrick, H. L.,	Lanier, Charles,	Littel, Eugene,
Kennan, George,	Lambert, Henry A.,	Littlejohn, James,
Kennedy, Robert L.,	Lambert, E. W.,	Livermore, Edwin R.,
Kennedy, Harvey,	Lamson, Charles,	Livingston, Robert E.,
Kent, Elmore A.,	Lamson, Leonidas M.,	Livingston, John A.,
Ketcham, Enoch,	Langer, Morris,	Livingston, C., (L. F.)
Ketchum, Franklin M.,	Lapsey, Samuel W.,	Livingston, R. J., (L. F.)
Ketcham, Wm. P.,	Larremore, Rich'd L.,	Lockwood, B.,
Keteltas, Eugene,	Lathers, Rich'd (L. F.)	Lockwood, Joseph B.,
Kibbe, Henry R.,	Lathrop, F. L., (L. F.)	Loew, Frederick W.,

Lord, George W. T.,	May, Lewis,	Moreau, John B.,
Lord, G. De Forest,	Mayhew, Francis L. B.,	Morel, E. B.,
Longstreet, Chas. A.,	Mayo, William S.,	Morgan, Charles L.,
Lorillard, Peter,	Maynard, George W.,	Morgan, W. F.,
Lorillard, George L.,	McAlpine, William J.,	Morgan, J. Pierpont,
Low, A. A.,	McAlpin, David H.,	Morgan, Edwin D.,
Ludlow, E. Livingston,	McClure, George,	Morgan, William D.,
Lydig, David,	McCreery, James A.,	Morrell, W. H., (L. F.)
Lyell, John H.,	McCurdy, R. H.,	Morris, Harry M.,
Lyman, Edward H. R.,	McDermott, James W.,	Morris, Gouverneur, Jr.
Maas, Abraham F.	McElligott, Henry R.,	Morris, Moreau,
Mackay, John M.,	McKenney, Gerald,	Morris, Henry L.,
Mackie, Robert,	McLean, James M.,	Morris, Robert R.,
Mackeller, William,	McMahon, M. T.,	Morrison, Henry,
MacLay, William B.,	McMullen, John,	Morrison, Edward,
MacLay, Isaac W.,	Meade, E. R.,	Morton, Levi P.,
MacLay, Robert,	Meeker, H. G.,	Mott, Alexander B.,
Macy, William H.,	Menken, J. Stanwood,	Moulton, Gilman S.,
Macy, Sylvanus J.,	Menzies, William,	Moulton, Clarence F.,
Macmillan, Frederick,	Merrall, William J.,	Mount, R. E., (L. F.)
Mailier, W. H.,	Merriam, Aug. C.,	Murdock, U. A.,
Maltby, Elsworth B.,	Merrick, John S.,	Murphy, Henry C.,
Mallory, Charles H.,	Meyer, F. William,	Murphy, J. Mortimer,
Mali, De Weyman,	Miles, Edward D.,	Murphy, Thomas,
Man, Albon P.,	Miller, Philip S.,	Murray, D. Colden,
Manners, David S.,	Miller, Charles H.,	Murray, Nicholas,
Mansell, Abraham,	Miller, Charles R.,	Myers, T. Bailey,
Marble, Manton,	Miller, Edmund H.,	Myers, John K.,
Marbury, Francis F.,	Miller, George M.,	Myers, John K., Jr.,
Marie, Peter, (L. F.)	Miller, Morris S.,	Myers, Alfred J.,
Marks, Joseph H.,	Mitander, Nils,	Myer, A. J.,
Marquand, Henry G.,	Mitchell, Cornelius B.,	Nassau, C. W.,
Marsh, Luther R.,	Mitchell, Grove P.,	Neergaard, William,
Marshall, D. D. T.,	Mitchill, Samuel A.,	Negus, T. S.,
Marshall, Charles H.,	Moir, James,	Nehrbas, Charles J.,
Marston, Charles E.,	Moller, Peter,	Neilson, William H.,
Martin, John M.,	Monroe, Ebenezer,	Neilson, Frederic,
Marti, Carlos,	Montgomery, Thos. H.,	Newberry, John S.,
Martin, William R.,	Montgomery, A. G. Jr.,	Newcombe, Isaac B.,
Martine, Randolph B.,	Moore, Geo. H., (L. F.)	Newell, Clarence D.,
Martin, Isaac P.,	Moore, Frank, (L. F.)	Newell, John,
Matsell, George W.,	Moore, W. H. H., (L. F.)	Niblo, William,
Matthews, E., (L. F.)	Moore, C. B.,	Nichols, Effingham H.,
Maury, Mytton,	Moore, Henderson,	Niles, Lucien H.,

Niles, William W.,	Parsons, George W.,	Powers, George J.,
Nones, Alexander,	Parsons, Charles C.,	Pratt, Daniel R.,
Norrie, Adams, (L. F.)	Parton, James,	Preble, John Q.,
Norris, George,	Paterson, Robert W.,	Prichard, William M.,
Norton, Eckstein,	Paton, William,	Prime, William C.,
Nourse, J. C.,	Paton, William A.,	Prime, Fred'k, (L. F.)
Nourse, Alfred P.,	Paton, John,	Prime, Fred. E., (L. F.)
Norwood, Carlisle, Jr.,	Pastor, Henry,	Prime, Temple,
Norwood, Andrew G.,	Paulding, Gouverneur,	Prince, Henry,
Oakley, E. Benedict,	Paulding, James P.,	Probasco, Samuel R.,
O'Callaghan, E. B.,	Paulison, John B.,	Pruyn, John V. L.,
O'Connor, Charles,	Pavy, Octave,	Punnett, James, (L. F.)
Offenberg, Baron,	Peabody, Charles A.,	Purdue, Joseph,
Ogden, William B.,	Peabody, Arthur J.,	Purser, George H.,
Ogden, Alfred,	Peake, William I.,	Putney, William B.,
Ogden, Gabriel V. N.,	Peckham, Walton H.,	Putzel, Mayer,
O'Hara, Charles E.,	Peek, William T.,	Pyne, Percy R.,
Olney, Peter B.,	Peirce, C. H.,	Quintard, Edward A.,
Olyphant, Robert M.,	Pell, Robert L.,	Radde, L. E. G.,
Onativia, Jose V.,	Pellow, Henry E.,	Radde, William,
Oppenheimer, Joseph,	Penfold, William Hall,	Ralli, Constantine P.,
O'Reilly, Henry,	Perault, George,	Ramsey, Charles G.,
Orton, William,	Perry, Oliver H.,	Randall, C. K.,
Osgood, James W.,	Pfeiffer, Carl,	Randolph, A. D. F.,
Osgood, William H.,	Phelps, Royal, (L. F.)	Ransom, F. A.,
Osgood, Franklin,	Phelps, Charles H.,	Rapallo, Charles A.,
Ostrander, P. W.,	Phelps, J. N.,	Rathbone, Aaron H.,
Ottendorfer, Oswald,	Phillips, George W.,	Raven, Anton A.,
Ottenheimer, Solomon,	Phoenix, S. W., (L. F.)	Raynolds, C. T.,
Owen, Edward H.,	Pierrepont, J. Jay,	Reckendorfer, J., (L. F.)
Owen, Edward L.,	Pierrepont, Edwards,	Redfield, Amasa A.,
Owen, Frederick N.,	Pierrepont, H. E., (L. F.)	Redding, George H.,
Packer, Elisha A.,	Platt, James N.,	Reed, Mrs. Sylvanus,
Palmer, Courtlandt, Jr.	Plum, Elias,	Reeve, Henry G.,
Palmer, F. A.,	Pondir, John,	Regensburger, M. H.,
Palmer, Ebenezer,	Poor, Henry V., (L. F.)	Reid, Whitelaw,
Palmer, James W., Jr.,	Popham, William H.,	Reinhart, B. F.,
Palmer, Francis H.,	Porter, David D.,	Remington, Samuel,
Pancoast, George,	Porter, John K.,	Remsen, William,
Pardee, Ario,	Porter, Nathan T.,	Renauld, Peter A. H.,
Paret, Henry,	Potter, Howard,	Requa, James M.,
Paris, Sherman,	Potter, Clarkson N.,	Reynes, Jayme,
Parish, Henry,	Potter, Orlando B.,	Rhineland, Wm. C.,
Parker, Willard,	Powers, William P.,	Rhoades, John H.,

Rhoades, Lyman,	Rutherford, L. M.,	Seligman, Jesse,
Ribon, J. J.,	Rutherford, John A.,	Seligman, Joseph,
Rice, William B.,	Ruthven, J. A.,	Seward, Clarence A.,
Richard, Charles B.,	Rutton, August,	Sewall, Henry F.,
Richards, August. D.,	Sachs, Henry M.,	Sewall, Robert,
Richard, Auguste,	Salomon, Edward,	Shaler, Alexander,
Richardson, Wm. A.,	Salmon, E. J.,	Sharpe, George H.,
Rich, John B.,	Salter, Thomas P.,	Shaw, J. T.,
Richmond, Henry A.,	Sands, Andrew H.,	Shea, George,
Riker, William J.,	Sands, Philip J.,	Sheafe, J. F.,
Riley, Charles V.,	Sands, Harry M.,	Sherman, W. Watts,
Rives, Francis R.,	Sanders, Lewis,	Sherman, William P.,
Robbins, Henry A.,	Sanford, Samuel B.,	Sherman, Benjamin B.
Robbins, C., (L. F.)	Sanger, A. L.,	Sherwood, John,
Robbins, George S.,	Sauer, Emil,	Shethar, Samuel,
Robeson, George M.,	Savage, John,	Siegman, Michael,
Roberts, Marshall O.,	Sawyer, Warren,	Sigel, Franz,
Roberts, E. H.,	Saxton, Samuel W.,	Simons, S. A.,
Robertson, D. A.,	Scammon, E. P.,	Simpkins, N. S., Jr.,
Robinson, Douglass,	Schafer, Samuel M.,	Simpson, James H.,
Robinson, Eugene N.,	Schafer, Simon,	Sistare, George K.,
Robinson, H. W.,	Schaus, William,	Skidmore, Jeremiah,
Robinson, Edm. R.,	Schell, Rich'd, (L. F.)	Slevin, James M.,
Roelker, Bernard,	Schell, August., (L. F.)	Slevin, Edward P.,
Rogers, Marvin N.,	Schenck, Noah H.,	Slevin, Thomas E.,
Rogers, H. Livingston,	Schermerhorn, W. C.,	Sloan, Samuel,
Rogers, William E.,	Schermerhorn, J. W.,	Smales, Holbert,
Rogers, David L.,	Schermerhorn, F. A.,	Smith, E. Delafield,
Rogers, C. B., (L. F.)	Shieffelin, S. B.,	Smith, James O.,
Rollins, Daniel G., Jr.,	Schieffelin, S. A.,	Smith, C. Bainbridge,
Rollins, Edward A.,	Schlesinger, B.,	Smith, James M., Jr.,
Roosevelt, Theodore,	Schmidt, Oscar E.,	Smith, Daniel D.,
Roosevelt, Robert B.,	Schnitzer, Jacob,	Smythe, Frederick,
Rose, Cornelius,	Schnerr, Constant,	Soper, William M.,
Ross, Arthur,	Schrenkeisen, Martin,	Southworth, Henry C.
Rowan, L. H.,	Schuchardt, Frederick,	Southworth, Alvan S.,
Rowland, William F.,	Shultz, John H., (L. F.)	Southworth, M. M.,
Riker, John H.,	Scott, Julian,	Spencer, Charles S.,
Ruggles, Samuel B.,	Scott, Henry L.,	Spencer, James C.,
Ruggles, Philo T.,	Scott, Thomas A.,	Spingarn, Siegmund,
Runkle, Cornelius W.,	Scribner, John B.,	Spinney, Joseph S.,
Russell, John A.,	Scudder, Henry J.,	Spofford, Paul N.,
Russell, Nathan, Jr.,	Sears, Herman B.,	Squires, Robert,
Russell, Archibald D.,	Seligman, James,	Stallknecht, F. S.,

Stanton, Charles,	Stuyvesant, Robert,	Trow, John F.,
Stanton, Walter,	Suckley, Geo., (L. F.)	Tuckerman, Walter C.,
Stebbins, Henry G.,	Sutherland, Josiah,	Tuckerman, Lucius,
Steele, Oliver R.,	Swan, Otis D.,	Tufts, Edwin O.,
Steiger, E.,	Swan, William H.,	Turner, Herbert B.,
Steinway, William,	Swarr, David M.,	Turney, P. W.,
Steinwehr, A. von,	Tailor, William H.,	Tyler, Arthur W.,
Stengel, Frederick,	Taintor, Joseph L.,	Ullio, Lorenzo,
Stephens, Edward,	Taintor, Giles E.,	Van Alen, James J.,
Stern, Myer,	Talmadge, Henry P.,	Van Alen, J. H.,
Stern, Simon H.,	Tapscott, James J.,	Van Amringe, J. H.,
Sterne, Simon,	Taylor, Douglass,	Van Brunt, Charles H.,
Stephens, Alex. H.,	Taylor, George,	Van Cott, Joshua M.,
Stevens, Simon,	Taylor, Bayard,	Van Cott, Cornelius,
Steward, D. Jackson,	Taylor, Alexander, Jr.,	Van Dusen, Samuel B.,
Stewart, Charles J.,	Taylor, Francis F.,	Van Rensselaer, Alex.,
Stewart, A. T.,	Taylor, Alfred J.,	Van Rensselaer, K.,
Stewart, Thomas E.,	Tefft, Erastus T.,	Van Santvoord, C.,
Stiger, William E.,	Telford, George A.,	Van Valkenburgh, P.,
Stillwell, Benjamin M.,	Tellkamp, T. A.,	Van Vorst, Hooper C.,
Stokes, James,	Terry, Edward,	Vanderbilt, W. H.,
Stockwell, A. B.,	Therasson, L. F.,	Vanderpoel, Aaron J.,
Stone, Henry,	Thompson, D. G. (L.F.)	Vail, Henry F.,
Storrs, Richard S., Jr.,	Thompson, Joseph P.,	Vermilye, William M.,
Storrs, Charles, (L. F.)	Thompson, James,	Viele, Egbert L.,
Stoughton, Charles R.,	Thorburn, W. H. S.,	Vincent, Frank, Jr.,
Stoughton, Edwin W.,	Thorne, Jonathan,	Voorhis, William,
Stout, John,	Thorne, William H.,	Vyse, Thomas A., Jr.,
Stout, F. A., (L. F.)	Tideman, Nicholas,	Wadsworth, Julius,
Straznicky, E. R.,	Tieman, P. C.,	Wadsworth, E. Clifford,
Strebeigh, Robert M.,	Tiffany, Charles L.,	Waite, M. R.,
Striker, J. A.,	Tilden, Samuel J.,	Waite, Charles C.,
Strong, W. L.,	Tillman, S. D.,	Wales, Salem H.,
Strong, Charles E.,	Tooley, James W.,	Walker, Wm. Augustus,
Stuart, W. W.,	Tomes, Francis,	Walker, William,
Stuart, Robert L.,	Tousey, Sinclair,	Wallack, J. Lester,
Stuart, Alexander,	Tower, Z. B.,	Wallis, George B.,
Stuart, Joseph,	Townsend, Martin J.,	Wall, Theodore M.,
Sturges, Frederick,	Townsend, R. W.,	Walter, Elwood,
Sturges, Thomas T., Jr.,	Tracy, William,	Walraven, Ira E.,
Sturgis, Frank K.,	Tracy, Charles,	Ward, Geo. C., (L. F.)
Sturgis, Appleton,	Tracy, John F.,	Ward, Elijah,
Stuyvesant, R., (L. F.)	Tremain, Edwin R.,	Warren, James K.,
Stuyvesant, Robert R.,	Trevor, John B.,	Warren, Geo. Henry,

Watson, William,	White, George E.,	Winston, Frederick S.,
Watson, B. F.,	White, H. C.,	Witthaus, R. A., (L. F.)
Watson, John H.,	White, John H.,	Witthaus, G. H., (L. F.)
Watts, Ridley, (L. F.)	White, Alexander M.,	Wood, Benjamin,
Webb, Alexander S.,	Whitlock, William, Jr.,	Wood, Benj. Jr.,
Webb, William H.,	Whittier, John G.,	Wood, Fernando,
Weber, Leonard,	Whitewright, W., Jr.,	Wood, James H. C.,
Weber, Albert,	Wiener, Jos., (L. F.)	Worcester, S. F.,
Webster, Sidney,	Willson, Louis M.,	Wolfe, Christopher,
Weeks, John A.,	Wilcox, Orlando B.,	Worthen, William E.,
Wells, Jacob,	Wilde, Samuel, Jr.,	Worth, James L.,
Wendell, Jacob,	Wiley, Franklin,	Wooster, George H.,
Wesendonk, Hugo,	Wilkeson, Samuel,	Wreaks, Charles F.,
Westermann, B.,	Wilson, J. G., (L. F.)	Wright, E. Kellogg,
Weston, Theodore,	Willard, Seymour,	Wright, William W.,
Wetmore, G. P., (L. F.)	Willetts, Samuel,	Wyckoff, Jacob F.,
Wetmore, Sam'l, (L. F.)	Wilder, Marshall P.,	Yamada, Yokichi,
Wetmore, W. B., (L. F.)	Williams, John S.,	Young, Mason,
Wetmore, George C.,	Williams, George G.,	Youngs, Alfred,
Weyman, Charles S.,	Williams, B.,	Youngs, Henry I.,
Wheeler, DeWitt C.,	Williams, S. C., (L. F.)	Zachos, J. C.,
Wheeler, Everett P.,	Williamson, David B.,	Zborowski, Martin,
Wheelwright, B. F.,		

PART I.

TRANSACTIONS OF THE SOCIETY

FOR THE YEAR 1874.

TRANSACTIONS OF THE SOCIETY FOR 1874.

Annual meeting of the American Geographical Society, held at the hall of the New York Historical Society, New York, January 13, 1874.

Chief-Justice DALY in the chair.

On motion of Mr. W. H. H. Moore, the reading of the minutes of the previous four meetings was postponed.

Mr. Stout, on behalf of Council, read the report, recommending the names of the following candidates for election :

Fellows — January 13, 1874. — Charles Gaylor, Menzo Diefendorf, Lewis M. Wilson, Harry M. Sands, Robert Curren, Theodore M. Wall, Henry Stone, Isaac V. French, Cornelius Van Cott, Cornelius B. Mitchell, Noah Davis, William M. Gabb, Henry Lewis Morris, Joseph Blumenthal, Oswald Ottendorfer, Prof. J. E. Nourse, William Watson, William H. Taler, Felix Adler, M. D., William F. Hawkins, Frank A. Gray, W. B. Coughtry, William M. Soper, E. Belden, M. D., James W. Tooley, Gerald McKenney, M. M. Southworth, Geo. B. Wallis, M. D., T. B. Connery, Henry Blood, Maunsell B. Field, William E. Rogers, W. A. Fitz Hugh, Charles Lamson, D. W. Bishop, William B. Rice, Gen. James B. Fry, U. S. A., Charles H. Phelps, N. A. Cowdrey, Gen. Henry Prince, U. S. A., Gen. Alexander S. Webb, C. H. Pierce, W. Whitewright Stuart, Joseph Ascher, Oliver R. Steele, Alexander Blumenstiel, Leopold Cohn, Max Landman, Michael Siegman, Julius Bien, Edward Lauterbach, Siegmund Spingarn, Melville Regensburger, David Greenebaum, Meyer S. Isaacs, Isaac S. Isaacs, Henry R. Brown.

Life Fellows. — Gen. T. Watts DePeyster, A. Gordon Hamersley, Louis C. Hamersley, F. S. Lathrop.

Corresponding Members. — Rev. R. H. Nassau, Gaboon, Africa; J. B. Steere, Philippine Islands; S. B. Luce, Captain, U. S. Navy, and D. L. Braine, Commander, U. S. Navy.

No ballot being called for, on motion, these gentlemen were declared elected members of the Society.

The President then vacated the chair, and Col. F. A. CONKLING, First President, occupied the same to the adjournment of the meeting.

Chief-Justice Daly thereupon delivered the annual address, selecting for his subject "The Geographical Work of the World in 1873.

After the conclusion of this highly interesting and elaborate address, and on motion of the Hon. Samuel B. Ruggles, seconded by the Rev. Wm. Adams, the thanks of the Society were presented, through the Chairman, to Chief-Justice Daly, and a copy of it requested for publication in the Bulletin.

Miscellaneous business being now in order, Col. Conkling read the annual report of Council for the year 1873.

General Cullum, in the absence of the Treasurer, Mr. Henry Clews, read his annual report.

On motion, both reports were accepted, and ordered to be placed on file.

Dr. A. K. Gardner, as Chairman, read the following report of the Nominating Committee :

NEW YORK, No. 237 E. THIRTEENTH ST.,)
January 12, 1874. }

The undersigned, duly appointed a Committee to nominate officers of the American Geographical Society for the coming year, respectfully present the following ticket for your action :

President — Charles P. Daly, LL. D.

Vice-Presidents — Frederick A. Conkling, Francis A. Stout,
Major-General George W. Cullum, U. S. A.

Foreign Corresponding Secretary — James Mühlenberg Bailey.

Domestic Corresponding Secretary — W. H. H. Moore.

Recording Secretary — Alvan S. Southworth.

Treasurer — Henry Clews.

Council — William Remsen, T. Bailey Myers, William Tilden Blodgett, William E. Curtis, George Cabot Ward, Theodore W. Dwight, LL. D., Elial F. Hall, William Jones Hoppin, E. R. Straznicky, M. D., Ph. D.

Respectfully,

A. K. GARDNER, *Chairman*.
HORATIO M. ALLEN,
CHARLES A. JOY.

Dr. A. K. Gardner then presented the following resolutions which were unanimously adopted :

Resolved, That the resignation by Dr. E. R. Straznicky, of the office which he has so long held in the Society, as Recording Secretary, demands, on the part of the Society, an acknowledgment of the great benefit it has received from his learning and efforts, for many years, in the discharge of varied duties, and in the general advancement of its interests. That the present prosperity of the Society is due in no inconsiderable degree to his exertions, and that we part with him as Recording Secretary, with a united feeling of respect and esteem.

Col. T. Bailey Myers then asked leave to read the following letter of B. F. Reinhart, Esq., addressed to the Society :

ARCADIAN CLUB, *January 8, 1874.*

DEAR SIR:—I beg to acknowledge the receipt of yours of the 6th inst. Although I am not insensible to the distinguished attainments of the late Sir Roderick Murchison, and of the honor you confer in asking me to paint his portrait, it would afford me much greater pleasure to execute a life size one of our President, Chief-Justice Daly, who has done so much to further the cause of Geographical Science and to establish the Society as a useful and influential body. I beg you therefore to say to the Council that I will be most happy to paint and present a life-size portrait of Chief-Justice Daly to the Society.

Your obedient servant,

B. F. REINHART.

ALVAN S. SOUTHWORTH, etc.

On motion of Mr. John Bauvard, Mr. Reinhart's proposition was unanimously accepted, and the General Secretary directed to communicate the fact to Mr. Reinhart.

Mr. Francis A. Stout then read seriatim the amendments to the by-laws, proposed at the last monthly meeting.

On motion, these amendments were declared unanimously adopted.

On motion, the meeting then adjourned.

Regular monthly meeting of the American Geographical Society, held in the large hall of the Cooper Institute, New York, February 16, 1874 ; Chief-Justice DALY in the chair.

The following-named gentlemen were recommended by the Council, for election as Fellows of this Society :

Fellows — February 16.— Rev. William Adams, D. D., Lloyd Aspinwall, Rev. Henry Ward Beecher, Elisha Brooks, Gen. A. E. Burnside, N. A. Baldwin, William Bell, Charles S. Brown, William Brough, Charles W. Burton, James Curphey, F. W. Christern, M. Carpenter, Chief-Justice Sanford E. Church, Henry G. Chapman, Henry Chauncey, H. C. Crane, John T. Conover, Milton Courtwright, Townsend Cox, James M. Coleman, Allan Campbell, George E. Church, B. S. Compton, John A. Dix, C. A. Dana, M. L. Delafield, Henry Delafield, E. Dutilh, John E. DeWitt, S. W. Dorsey, Edward Dodge, Samuel Donner, J. W. Doubleday, Loyall Farragut, L. W. Frost, Morris Franklin, J. W. Foshay, Charles L. Frost, William Foster, Jr., Mortimer Fowler, D. W. Fenton, Henry Gurley, William H. Gray, Hugh Gardner, Wareham Griswold, A. W. Gill, C. C. Gilman, J. Green, Frederick Houlden, Col. George S. Hastings, Rufus Hatch, S. S. Haldeman, John Hay, Elisha Harris, M. D., E. S. Higgins, W. F. Havemeyer, J. Q. Hoyt, P. W. Holmes, W. A. Hall, C. P. Huntington, Allan Hay, H. M. Hamilton, Leonard W. Jerome, John Q. Jones, Joshua Jones, Lewis C. Jones, Edward A. Jones, W. D. Judson, M. K. Jessup, Eugene Keteltas, Gideon L. Knapp, Edward King, Joseph F. Knapp, C. H. Kendrick, Robert J. Livingston, Arthur Leary, Col. A. B. Lansing, Woodbury Langdon, Walter Langdon, John H. Lyell, Henry Lewis, DeWitt C. Littlejohn, C. F. Mayer, Gen. M. T. McMahon, Silvanus J. Macy, Josiah Macy, Jr., O. P. Morton, Moreau Morris, M. D., Manton Marble, John K. Myers, D. D. T. Marshall, W. H. Mailler, Lucien H. Niles, John Newell, Franklin Osgood, Benjamin Pike, William S. Pierson, Willard Parker, M. D., J. Jay Pierrepont, W. E. Plummer, R. M. Pomeroy, C. J. Pusey, W. W. Phelps, William A. Richardson, G. M. Robeson, Whitelaw Reid, E. R. Robinson, Col. L. H. Rowan, Francis R. Rives, L. D. Rucker, William P. Sherman, William R. Stewart, E. J. Salmon, Philip J. Sands, Stephen Smith, M. D., William Steinway, G. B. Satterlee, Charles Stanton, A. B. Stockwell, B. E. Smith, Samuel Sloan, George H. Sharpe, J. D. Smith, D. N. Steele, J. J. Shiperd, Jacob Sharp, John G. Stevens, Henry Snell, John F. Trow, John F. Tracy, James J. Tracy, W. H. Vanderbilt, Alexander Van Rensselaer, Cornelius Vanderbilt, Henry Wilson, Edgar Williams, J. Lester Wallack, George P. Wetmore, Albert Weber, George G. Williams, John R. Waller, George Henry Warren, Ellwood Walter,

William Walker, Sidney Ward, Hugo Wesendonek, C. C. Waters, Julius Wadsworth, George E. White, Lucien Birdseye, Everett P. Wheeler, John L. Hill, Eugene Littel, Samuel R. Probasco, Frank Vincent, Jr., Miles Bradley, Archibald Johnston, Baron Offenbergh, Gen. W. S. Hancock, U. S. A., Hermann H. Cammann, Willard Bartlett, Charles S. Weyman, W. Weyman Mali, Henry J. Cammann, Lieut.-Commander Henry C. White, U. S. N., Lieut.-Commander Philip H. Cooper, U. S. N., Jacob H. V. Cockcroft, Edward Frith, F. Augustus Schermerhorn, William A. Wheelock, William M. Bliss, William Cullen Bryant, Admiral D. D. Porter, U. S. N., William H. Macy, Daniel Drake Smith, Chief-Justice M. R. Waite, William J. McAlpine, William Voorhis, Augustin Daly, Prof. J. C. Zachos, Caleb Cushing, Joseph R. Kearny, C. W. Bouck, Robert L. Case, William Orton, Robert Squires, Pliny Freeman, Rev. Robert R. Booth, D. D., James Kent, Thomas Allen, Gen. W. T. Sherman, U. S. A., David G. Thompson, Col. Thomas B. Arden, Gen. E. P. Scammon, Gen. Rufus Ingalls, U. S. A., Henry E. Eakin.

Life Fellows.—Charles Storrs, Romaine Dillon.

Corresponding Member.—Hon. Frederick Henley, British Foreign Office, London.

No ballot being called for, on motion, these gentlemen were declared elected Fellows of the Society.

More than three thousand ladies and gentlemen were present, as many more going away, unable to obtain seats.

Extraordinary interest was manifested in the proceedings.

Lieutenant-Commander H. C. White, U. S. N., executive officer of the *Tigress*; Captains Buddington, Tyson and Chester; Mr. Bryan, the astronomer of the *Polaris* expedition, several survivors of the crew, and the Esquimaux Joe and Hannah had places on the platform.

A large number of curiosities, illustrative of Arctic life and scenery, were exhibited and explained to the Fellows.

The Chairman then introduced to the audience the eminent Arctic explorer, Dr. I. I. Hayes, who made some lengthy and appropriate remarks, and was followed by Mr. R. W. D. Bryan, Captains Buddington, Tyson and Chester.

A vote of thanks was unanimously tendered to these gentlemen.

Mr. William Bradford exhibited, by means of the stereopticon, a series of photographic views taken by himself and Dr. Hayes within the Arctic circle, dwelling at length on the customs of the Esquimaux.

Mr. J. Carson Brevoort then offered the following resolution, which was seconded by Dr. Hayes, and unanimously adopted:

WHEREAS, A precedent has been established by the English, German and other governments by which it is recognized as an act of justice that the survivors of polar expeditions and other dangerous exploring enterprises should receive extra pay for their services; and,

WHEREAS, The officers and crew of the *Polaris* expedition have suffered more than any other explorers of modern times, while affording, by their labors, important contributions to geographical knowledge; therefore,

Resolved, That the American Geographical Society is convinced that the survivors of the *Polaris* are entitled to a generous compensation in addition to the regular rates allowed them by the government in view of the perils and hardships they underwent during the extraordinary cruise of that vessel within the Arctic circle, and that the Society will use all proper influence with the government to accomplish that object.

Mr. Henry C. Murphy, of Brooklyn, then made a few remarks in advocacy of the resolution, and said that, if the government fitted out another Arctic expedition, the proper man to command it was the explorer who had so eloquently spoken to them during the evening, Dr. Hayes. Mr. Murphy closed by calling for a vote of thanks to the gentlemen who had contributed so much to the evening's entertainment. This was given, and the meeting then adjourned.

Meeting of the American Geographical Society, held in the large hall of the Cooper Union, New York, February 26, 1875; Chief Justice DALY in the chair.

The following-named gentlemen were recommended by the Council for election as Fellows of the Society:

Fellows—*February 26, 1874.*—James L. Abbot, Austin Abbott, James E. Abbott, Charles Abernethy, George Ackerman, A. T. Ackert, Charles D. Adams, James R. Adams, Thatcher M. Adams, John Adriance, John Aitken, William B. Aitken, Lewis K. Albro, Junius B. Alexander, Henry W. Allen, Horace Andrews, Loring Andrews, Richard Arnold, Gustavus Arnold, Benjamin Babcock,

Henry C. Backus, Wm. W. Badger, James Baker, Jr., Cyrus Baldwin, James M. Baldwin, Thomas P. Ball, Eugene S. Ballin, James H. Banker, Wm. E. Barnes, Newcomb C. Barney, W. H. Barnum, John J. Barrill, H. K. Barstow, Edward T. Bartlett, Zenas D. Bassett, Edgar C. Baylis, P. Bissinger, James M. Constable, William Constable, John C. Calhoun, Wm. B. Calkins, Chas. F. Chickering, S. B. Chittenden, Luther C. Clark, Cornelius Comstock, Stephen V. R. Cooper, Joseph Coutt, Charles Cowan, Walter S. Cowles, Robert L. Cutting, Jr., Thomas Denny, Jr., John T. Denny, Jas. F. DePeyster, E. E. Davis, Thompson Dean, Oliver Ditson, Frank E. Draper, Joseph W. Drexel, Benjamin Dreyfus, G. B. Dubois, John Dymond, David J. Ely, Andrew Ellison, Jr., Chas. F. Elwell, C. F. Emerson, Francis Endicott, P. W. Engs, Edward Entwistle, Magnus Ericksen, William H. Erwin, M. G. Evans, J. P. Girard Foster, Wm. G. Fargo, Egisto P. Fabbri, Watson B. Farr, Charles Faulkner, Cornelius Fellows, Harvey Fisk, Louis Francis, Jonas R. Franke, John R. Garland, James Gordon, Augustus W. Greenleaf, John A. Gwynne, H. L. Hoguet, Oliver Hoyt, Wm. A. Hadden, Edward Haight, Jr., Robert N. Hand, John T. Hanna, Fletcher Harper, Dan'l B. Hatch, Roswell D. Hatch, Hector C. Havemeyer, Frank O. Herring, Wm. L. Jenkins, Edward S. Jaffray, Wm. P. Jaffray, Gerhard Janssen, William M. Johnson, Orange Judd, Harvey Kennedy, George Kenneth, Franklin M. Ketchum, Vincent B. King, H. B. Kumhardt, De Witt C. Lawrence, George W. T. Lord, Peter Lorillard, Peter Moller, George M. Miller, William T. Meredith, Chas. L. Morgan, Meadows T. Nicholson, Robert M. Olyphant, Charles R. Otis, Henry Paret, William I. Peake, Elias Ponvert, Jr., Isaac A. Quackenboss, E. A. Quintard, Geo. S. Robins, Alexander H. Rainey, James Renwick, Auguste Richard, Edward A. Rollins, James A. Roosevelt, Philo T. Ruggles, Daniel E. Rutherford, Robert Stuyvesant, Robert R. Stuyvesant, John Blair Scribner, Henry J. Scudder, Walter C. Tuckerman, Moses Taylor, H. A. C. Taylor, Col. Henry L. Scott, U. S. A., William H. S. Thorburn, J. A. Ruthren, John T. Agnew, F. F. Gunther, Henry C. Allen, Charles G. Gunther, William Henry Gunther, Rev. Roswell D. Hitchcock, D. D., Charles B. Alexander, Jeremiah Devlin, E. G. Field, William T. Morgan, James Ross, M. D. J. B. Beardsley, Clark Bell, J. Stanwood Menken, Jacob Schnitzer, Edward Morrison, Arnold Friedman.

No ballot being called for, the above-named gentlemen were declared duly elected Fellows of the Society.

The President then introduced to the Society Mr. J. R. MacGahan, who read a paper on "Khiva." At the conclusion of Mr. MacGahan's highly interesting paper, and after a few remarks by General William T. Sherman, U. S. A., a vote of thanks was given him, on motion of Dr. I. I. Hayes.

The meeting then adjourned.

Regular monthly meeting of The American Geographical Society, held at the hall of the New York Historical Society, Second avenue and Eleventh street, New York, March 10th, 1875; Chief-Justice DALY in the chair.

The following-named gentlemen were recommended by the Council for election as fellows:

Fellows Elected March 10, 1874—Nicholas Murray, John S. Barnes, J. V. Onativia, R. E. Deyo, John Guth, Martin Schrenk-eisen, J. W. Bouton, Joseph Stuart, William H. Caswell, Major-General Orlando B. Willcox, U. S. A., Commander K. R. Breese, U. S. N., Lieutenant S. A. Simons, U. S. N., William M. Kingsland, Philip S. Miller, Henry R. McElligot, William Radde, Louis Radde, L. F. Therasson, Peter B. Olney, Augustus L. Richards, P. C. Tiemann, Walter S. Carter, Walter S. Fairfield, J. M. Ceballos, Thomas H. Montgomery, Salem H. Wales, David B. Acker, Miguel de Aldama, Francis Alexandre, J. H. Alexandre, Julien L. Allien, Elbert E. Anderson, Charles L. Anthony, Chester A. Arthur, Joseph J. Asch, Theodore P. Austin, Henry B. Auchincloss, John T. Audenried, August Aufermann, George H. Andrews, Conrad G. Bachmann, John Bailey, Orville R. Baker, Townsend B. Baldwin, Benjamin L. Ballou, Elijah K. Bangs, Anthony B. Banks, Thomas Barbour, Levi M. Bates, Herman Batjer, William Betts, Edward A. Bibby, Louis B. Binsse, Samuel A. Blatchford, Anthony J. Bleecker, John Bloodgood, Norman S. Boardman, Charles Boese, Orlando M. Bogart, George W. Cable, Gilead W. Candee, Wm. H. Caldwell, Madison M. Caleb, Samuel Castner, David Carr, Leslie Chase, Cyrus H. Chatfield, John P. Chatillon, J. W. Chrisholm, Matthew E. Clarendon, Henry S. Camblos, John Campbell, James B. Carter, John R. Cecil, Francis D. Cobb, Albert J. Disney, Chas. Donohue, Wm. B. Dana, Frank Dana, Alfred B. Darling, Thomas Darlington, Stratford P. Davidson, John J. Decker, S. M. Deering, Leonardo Del Monte, Charles A. Denny, George Dickinson, Emil Dieckerhoff, Dorman B. Eaton, Thomas Eakin, Albert L. Eastman, John Eaton, Charles C. Edey, Milton C. Egbert, John Eggert, Warren Ellis,

Henry K. Enos, C. G. Francklyn, George J. Foster, Egbert H. Fairchild, William Fullerton, Henry C. Fuller, James Fraser, Mortimer L. Fowler, Joseph Foulke, Edward E. Floyd, Arthur T. Fitch, Charles M. Field, William Field, George J. Ferry, Arthur P. Fenner, William S. Felt, Charles H. Fellows, John P. Fellows, Thompson J. S. Flint, James C. Griswold, Benjamin H. Hutton, Henry A. Heiser, Henry A. Hurlbut, Charles Jenkins, Jacob Lorillard, George Lorillard, James W. McDermott, William C. Neergaard, Samuel U. F. Odell, F. A. Palmer, General Franz Sigel, Alexander Taylor, Jr., Frederick Talbot, Francis F. Taylor, Erastus T. Tefft, Robert L. Taylor, Simon de Visser, Auguste Vatable.

Corresponding Members—S. Wells Williams, LL. D., U. S. Legation, Peking, China; Captain John Melmoth Dow, Panama; Dr. McDowell, Panama.

No ballot being called for, the above-named gentlemen were declared duly elected fellows and corresponding members of the Society.

On motion of Mr. Stout, the following resolution was unanimously adopted:

Resolved, That the thanks of the Society be communicated to the Italian Geographical Society, for the extremely interesting and valuable information forwarded to President Daly, concerning the recent earthquake in northern Italy, and furthermore that the Secretary be directed to express to Signor de Luca, Italian Consul-General at this port, the obligations of the Society, for the trouble he has taken in assisting to investigate this important subject.

Mr. Stout then read the following letter:

(*Translation.*)

GERMAN ASSOCIATION FOR POLAR EXPLORATION, }
BREMEN, February 19, 1874. }

Much Respected Sir:—In the name, and by direction of the German Association for Polar Exploration, we have the honor to communicate to you the fact that, upon the recommendation of the members of the last German Polar Expedition, it has been resolved to name one of the lately-discovered capes in Eastern Greenland, Cape Daly, in recognition of the lively interest he has manifested in German Polar Exploration, and consequently his name has been so engraved upon the newly-constructed maps of the work which is soon to appear.

With distinguished consideration,

DR. M. LINDEMAN, *Secretary.*

ALBERT ALBRECHT, *President.*

Mr. Stout gave notice of his intention to move the adoption of the following amendment to the by-laws, at the next meeting :

Resolved, That section 3 of chapter 4 of the by-laws be amended by substituting for the word "fifty" the words "one hundred."

The following resolution was then, upon Mr. Stout's motion, unanimously adopted :

Resolved, That this Society deems itself highly honored by the action of the German Association for Polar Exploration, in placing the name of our distinguished President upon the maps of Greenland, thus recognizing the Society's persistent efforts to forward the solution of the North Polar mystery, in which work Chief-Justice DALY has been one of the most conspicuous of modern geographers.

Hon. John M. Francis then read a paper on "Greece as it is." Prof. J. C. Zachos explained the stereopticon views displayed, at the close of the reading of the paper.

Hon. Samuel B. Ruggles moved a vote of thanks, after which the meeting adjourned.

Regular monthly meeting of the American Geographical Society, held at the hall of the Young Men's Christian Association, corner of Twenty-third street and Fourth avenue, New York, April 15th, 1874; Chief-Justice DALY in the chair.

The following-named gentlemen were recommended by the Council for election as Fellows :

FELLOWS: *April 15, 1874.* — Charles Francis Adams, Alexander McL. Agnew, Rev. John Hughes, General Abram Duryee, Edward C. Gillespie, Horace Barnard, Lieut. Henry Clay Cochrane, U. S. M. C., Isaac T. Coates, M. D., F. L. Gleason, Rev. Mr. Gage, Giles E. Taintor, Rev. Nicholas Bjerring, John P. Haines, William Dowd, President F. A. P. Barnard, John Benjamin, Oliver W. Barnes, Conrad Braker, Jr., Samuel P. Avery, L. Curran Clark, Charles E. Contan, W. W. Astor, Andrew J. Constantine, John Constantine, William B. Clerke, John H. Hinton, M. D., Samuel Willets, E. W. Leavenworth, Edward H. Owen, Arthur J. Peabody, M. H. Lehmaier, Col. B. F. Watson, Leopold Eidlitz, James Moir, Rev. O. B. Frothingham, D. Cady Eaton, Gerrit Smith, John K. Myers, Jr., Charles V. Riley, Diego De Castro, George G. Haydock, K. Van Rensselaer, Alexander B. Mott, M. D., E. M. LeMoyne, Isaac W. Maclay, Alexander Dalrymple, Alexander D. Irving, Prof. R. D. Irving, Charles D. Ingersoll, Henry P. Kidder, James Stokes, Samuel W. Lapsley, Frederick Chauncey, Bernard G. Amend, Arthur Amory, D. S. Apple-

ton, George S. Appleton, John A. Appleton, W. W. Appleton, W. H. Atkinson, Carlton Ayres, Robert Bonner, Thomas Barron, H. J. Baker, Martin Bates, Jr., Eugene B. Beebe, Isaac Bell, Wm. B. Bonn, Joseph Brokaw, Wm. Allen Butler, George J. Byrd, Isaac Butts, Robert Colgate, Edward Clark, James B. Colgate, Jonas G. Clark, Wm. L. Cogswell, Abraham H. Cardozo, Ernest Caylus, Fred. H. Cossitt, Samuel J. Colgate, Francis Cottenet, John Crerar, J. Schuyler Crosby, Erastus Corning, David Crocker, John P. Crosby, George Crouch, Edwin A. Cruikshank, C. C. Coffin, Otis Clapp, John H. Davis, Samuel D. Davis, Cornelius H. Delamater, Edward F. De Lancey, L. Delmonico, Francis Dane, William A. DuBois, Frederick F. Dufais, Timothy T. Dwight, Charles Dancker, James B. Davenport, Edmund T. Davis, Alfred R. Davison, James A. Day, Jesse C. Dayton, George F. Dickinson, Wilbur F. Disosway, William P. Dixon, Robert W. Donnell, Edwin A. Doolittle, Louis Dryfoos, Martin H. Duane, William H. Duff, Marc Eidlitz, Charles E. Eek, George A. Evans, Thomas W. Evans, Benjamin J. Eyre, Ralph W. Emerson, Frederick W. Foeller, William Foerster, William Foos, Robert E. Foot, Ernesto G. Fabbri, Franklin Fairbanks, Oliver S. Fleet, Alexander Forman, William R. Foster, Christian Fred. Funch, Nathaniel B. Falconer, James J. Ferris, Henry G. Fisk, Arthur D. Fiske, Lewis Fatman, Channing G. Fenner, Meyer Feuchtwanger, Sigismund Feust, Joseph Fields, Lamar Foos, John B. Ford, James E. Fountain, Baldwin N. Fox, August H. Francke, Jos. J. Freeman, William T. Garner, Frederick E. Gibert, Theodore K. Gibbs, Henry Gitterman, James H. Goadby, W. Henry C. Greene, B. W. Griswold, Walter S. Gurnee, John Ganson, William H. Goadby, Charles H. Gage, Horace Galpen, John N. Gamewell, Jacob S. Gans, Elmer H. Garbutt, Harrison E. Gawtry, William J. Gelston, William A. Gibson, Daniel W. Gillett, Richard J. Goodwin, William W. Goodrich, Eugene A. Gross, Joseph Gould, John H. Gresham, Prof. Wolcott Gibbs, Horace Gray, Samuel Hawk, Charles L. Hallgarten, John C. Ham, James Havemeyer, A. C. Hawes, Charles W. Hays, M. M. Hendricks, William Tod Helmuth, Henry F. Hitch, M. F. Hodges, Peter S. Hoe, Richard M. Hoe, E. F. Holbrook, E. W. Holbrook, M. L. Holbrook, M. D., W. W. Hoppin, Jr., Samuel T. Hyde, Adolphus Hallgarten, Lazarus Hallgarten, Theodore Haviland, Joseph Haydock, Benjamin E. Hale, Isaac N. Halladay, Edward P. Hamilton, John H. Hamilton, D. Willis James, W. P. Iddings, Adrian Iselin, Jr., William E. Iselin, Conrad N. Jordan, Charles Immer, Alexander P. Irvin, Theodore A. Ives, Dotius D. Ives, Frederick W. Jackson, Henry W. Jackson, Ebenezer Jackson,

John H. Jaëquelin, Robert M. Jarvis, Mordecai Johnson, William Johnston, William C. Jones, Richard M. Jordon, Edward Jordon, Orlando W. Joslyn, Samuel B. H. Judah, Gouverneur Kemble, Jr., William Kemp, William K. Kitchen, E. Krackowizer, M. D., Lawrence Kip, Charles H. Kalbfleisch, Thomas Kane, Martin Kattenhorn, Thomas Keck, Samuel T. Keese, Merrill M. Kelton, Elmore A. Kent, Julius Knoedler, H. A. Kruger, Abraham Kuhn, Charles G. Landon, Samuel A. Lewis, John A. Livingston, L. M. Livingston, Robert E. Livingston, B. Lockwood, G. DeForest Lord, E. Livingston Ludlow, Charles Lanier, Henry D. Lapaugh, Simon A. Lash, John C. Latham, Jr., John P. P. Lathrop, Joseph B. Lawrence, Walter E. Lawton, Benjamin F. Lee, Joseph Levine, Alfred B. Lewis, James Littlejohn, Edwin R. Livermore, Walter S. Logan, Josiah Lombard, Charles A. Longstreet, Charles A. Lord, J. Pierpont Morgan, R. H. McCurdy, George McMiller, Clarence F. Moulton, Gilman S. Moulton, Nils Mitander, Joseph McArthur, Thomas W. Mabb, T. S. Negus, Clarence D. Newell, Andrew G. Norwood, Charles E. O'Hara, S. Whitney Phoenix, I. N. Phelps, Orlando B. Potter, George Pancoast, Walton H. Peckham, Robert L. Pell, William Hall Penfold, John Pondir, William H. Popham, J. J. Ribon, William J. Riker, H. Livingston Rogers, Marvin N. Rogers, Daniel G. Rollins, Jr., Adolph Rusch, August Rütton, D. Jackson Steward, Benjamin B. Sherman, Samuel B. Schieffelin, Alexander Henry Stevens, Thomas A. Scott, B. Schlesinger, J. F. Sheafe, Samuel Shether, Jeremiah Skidmore, W. L. Strong, Thomas T. Sturges, Jr., Appleton Sturgis, Josiah Sutherland, John P. Sutherland, Rev. Richard S. Storrs, Jr., D. D., John B. Trevor, Jonathan Thorne, Francis Tones, Sinclair Tousey, J. Wingate Thornton, Thomas A. Vyse, Jr., J. H. Van Amringe, P. Van Volkenburgh, W. M. Vermilye, DeWitt C. Wheeler, B. F. Wheelwright, William Whitlock, Jr., Charles T. Whybrew, M. D., Franklin Wiley, John S. Williams, David B. Williamson, William W. Wright, Jacob F. Wyckoff, S. T. Worcester, Marshall P. Wilder, John G. Whittier, Mason Young.

Corresponding Member. — Captain R. H. Wyman, U. S. Navy, Washington, D. C.

No ballot being called for, the above-named gentlemen were declared duly elected Fellows and Corresponding Members of the Society.

Dr. F. V. Hayden was then introduced to the Society, by the President, who read a paper on our "National Parks."

On motion of Mr. Stout his amendments offered to the by-laws, as per minutes of last meeting, were then adopted.

Prof. Theo. W. Dwight moved a vote of thanks highly commending the labors of Dr. Hayden.

On motion, the meeting then adjourned.

Memorial meeting of the American Geographical Society held at the Academy of Music, New York, April 23d, 1874; Chief-Justice DALY in the chair.

Twenty-five hundred Fellows and guests were present. After an explanation of the physical structure of Africa traversed by Livingstone, eloquent orations were made by Major H. C. Dane, Rev. Wm. Adams, D. D., Rev. Henry Ward Beecher, Dr. I. I. Hayes, and Rev. Noah Hunt Schenck, D. D.

The Government Band, furnished by the kindness of Gen. Hancock, played dirges at intervals during the evening.

A portrait of Dr Livingstone, painted without cost to the Society, by Mr. B. F. Reinhart, was appropriately draped, and the Academy was decorated in black and white.

At the close of Rev. Dr. Schenck's address the Society adjourned.

Regular monthly meeting of the American Geographical Society, held at the Hall of the Young Men's Christian Association, corner Twenty-third street and Fourth avenue, New York, May 7th, 1874; Col. F. A. Conkling in the chair.

The following-named gentlemen were recommended for election as Fellows of the Society by the Council:

FELLOWS: *May 7, 1874.* — Elijah Alliger, Warren N. Abbott, R. W. Aborn, Charles A. Abbott, Robert W. Aborn, Rufus F. Andrews, Charles L. Acker, Peter D. Ackerman, E. L. Andrews, Russell W. Adams, William H. Allen, J. W. Allen, Hester J. Allison, William Alsop, Francis H. Amidon, Henry Amy, Henry H. Anderson, Andrew T. Anderson, Edward Anthony, P. J. Armour, Leon Abbett, Francis H. Abbott, J. H. Abbott, Daniel Ackerman, Stillman Adams, John P. Adams, S. M. Aikman, Henry Alber, James H. Aldrich, James A. Alexander, Samuel H. Allen, C. B. Alston, D. T. Ames, John H. Anderson, John F. Anderson, Jr., Henry F. Anderson, Robert T. Andrews, John C. Atwater, Louis J. Apgar, Chas. Bard, M. H. Bartow, David B. Babcock, E. C. Badeau, Wm. A. Beach, H. Bacharach, George Baker, A. H. Barbey, Richard Bell, W. H. Bibbey, Abraham Backer, Chas. B. Badeau, Joseph D. Badgley, Peter C. Baker,

H. W. Beach, David P. Baker, Henry A. Barling, Thomas L. Ball, Geo. M. Ballard, T. Edward Bond, Francis N. Bangs, William C. Banning, William Barr, Samuel Barton, Julius Bauer, William H. Baxter, Lawrence P. Bayne, Claudius F. Beatty, Milo M. Belding, Andrew J. Bentley, Jos. R. Curtis, H. B. Crosby, T. P. Chapman, James C. Cloyd, Hiram B. Crosby, Alfred L. Case, H. B. Camp, Stephen Cabot, Howard Campbell, Richard J. Capron, Thos. F. Carhart, Warren Carle, Alonzo F. Carman, Oliver S. Carter, Julius Catlin, Jr., Roswell W. Chamberlain, James E. Chandler, Edward E. Chase, Frederick Chase, Jos. F. Chatelier, Wm. H. Cheppu, Geo. H. Chickering, Wm. F. Clarke, Wm. Clyde, Henry Collins, Wm. L. Conyngnam, William B. Crocker, George A. Crocker, W. H. Deming, Chas. H. Dewing, Wm. P. Douglas, Henry De Coppet, C. M. Da Costa, William C. Dewey, John E. Dow, Jr., Parley A. Dailey, Jos. H. Daniels, Geo. W. Davids, Isaac O. Davis, Martin N. Day, R. G. Dun, Rudolph Degener, H. H. Deniker, John G. Davis, James E. Derippe, Edmund A. Dickerson, John B. Dickinson, Dabney W. Diggs, Jos. M. Dixon, Thomas H. Doughty, Wm. F. Drake, John H. Duke, Jos. H. Dukes, Richard T. Dunscorn, F. A. Dwight, John Dowley, Marshall S. Driggs, Richard H. Drummond, Smith Ely, Jr., Andrew Foster Elliot, Charles W. Ellis, S. B. Eaton, Cheever N. Ely, Thomas Evans, John Ewen, Jr., Charles H. Farham, Adam C. Fellows, Wm. D. Foulke, Charles E. Field, Fred. W. Fisher, Jas. D. Fowler, H. A. Faushawe, Thomas Farley, Robert Fernandez, Franklin G. Fisk, Robert A. Fliess, John A. Foster, Luther J. Foster, Edmund C. Fougere, Charles P. Frame, Thos. H. French, Louis W. Frost, John A. Fuchs, Francis P. Fernald, Jr., James D. Frary, Geo. H. Forster, Francis H. Grain, Daniel L. Gabel, Jos. H. Gray, John L. Gardiner, John L. Gassert, Rev. G. Gottheil, F. W. Geissenhainer, Jr., William H. Geissenhainer, Dr. Harvey S. Gay, Wm. H. Gibson, Wm. J. Gilbert, Jas. F. Gildersleeve, Chas. F. Gilman, Peter Gilsey, Jr., Stephen A. Ginna, Wesley Gleason, David Glencross, John Glover, Wm. J. Golder, Simon Goldsmith, R. M. Gomez, Brent S. H. Good, Samuel J. Goodenough, Edwin G. Gorton, Henry A. Gouge, James H. Goodsell, John H. Graham, Henry M. Graves, Adam R. Gray, Volney Green, J. G. Hamilton, F. A. Howard, Joshua Hendricks, Edmund Hendricks, Wm. F. Holcombe, M. D., Lawrence Hutton, Robert Haydock, Chas. F. Hunter, John R. Howard, John W. Hunter, Jas. W. Hawes, T. S. Harrison, John Haack, Napoleon J. Haines, Albert C. Hall, John H. Harbeck, Wm. K. Hall, Nathan Harper, Theo. B. Hamilton,

Elwood Hampton, Edward Harbison, Abram S. Harding, Chas. F. Hardy, William B. Harrison, Edward H. Harriman, Henry Harris, John R. Harris, Burton N. Harrison, William S. Hascall, Walter T. Hatch, E. L. Hayes, Jacob Hays, Bernard Illfelder, William H. Inman, Henry Irwin, Fred. E. Ives, Chas. C. Jackson, Wm. H. Jackson, Vincent Jansky, F. W. Jarvis, Jos. A. Jameson, Thomas W. Jenkins, Philip Jeselson, Geo. W. Jewett, Geo. L. James, Wm. James, David H. James, Henry J. Johnson, John J. Johnston, Mellville M. Johnston, Francis Johnstone, D. S. Jones, James L. Jones, John J. Jova, Hophni Judd, Ira A. Kipp, Chas. H. Kitchel, Herman H. Kattenhorn, Samuel Kaufman, Chas. M. Keller, Hiram Kellum, H. R. Kelly, Julius Kayser, Robert F. Kelly, John H. Kemp, Isaac Kent, Geo. P. Kato, Enoch Ketcham, Wm. P. Keicham, Henry R. Kibbe, Wm. F. Kidder, Henry Kiggins, Chas. H. Kimball, Robert Kind, Bennett J. King, Wm. H. King, Edw'd A. Kingsland, Joel S. Kinne, Alex. F. Kircheis, James Kitchen, Robert N. Kitching, Geo. Knox, John Knowler, F. Leuthner, Edw'd L. Lacey, Richard Lacey, Wm. Laidlaw, L. M. Lawson, Gaston Lamothe, Geo. W. Lane, A. M. Levino, Morris Langer, Geo. Lanman, Gustav Lasker, DeWitt C. Lent, Bernard Latermann, James Lawrence, Jos. Lederle, Effingham N. Lawrence, A. C. Lawrence, Samuel B. Lawrence, Geo. P. Lawrence, S. R. Leshner, Jos. Lea, Walter L. Leaman, Jeremiah Leaycraft, Joseph Lacomte, Andrew R. Leggat, Francis W. Leggett, Amory Leland, Wm. H. Lent, Walter H. Lewis, Jas. D. Lincoln, Jos. B. Lockwood, Henry A. Lambert, G. P. Lowry, David H. McAlpin, R. H. Manning, Alex. McAndrew, John L. McCabe, D. McMahon, John D. McKenzie, John McKeon, Abraham W. Maas, John M. Mackay, Alex. Mackensie, Andrew W. Mackie, George Maclean, Chas. H. Mallory, Ellsworth B. Maltby, Albon P. Man, Abraham Mansell, Jos. H. Marks, Carlos Marti, John M. Martin, James Matthews, Francis L. B. Mayhew, Geo. W. Maynard, Benj. W. Merriam, Washington I. Moore, Wm. I. Merrall, John R. Marshall, Wm. W. Niles, Alberto Nadal, Chas. C. Nagel, Julius Newwitter, I. B. Newcombe, Geo. Norris, Wm. F. Niles, Alex. Nones, John H. Northrup, C. J. Nehrbas, Eckstein Norton, Carlisle Norwood, Jr., Alfred P. Nourse, Augustus M. Novelli, Sam'l A. Noyes, Charles H. Noyes, E. L. Owen, P. W. Ostrander, John Oakley, E. B. Oakley, J. J. O'Kelly, John T. Oakley, Henry Oelrichs, Gabriel V. N. Ogden, James Oliphant, Wm. M. Onderdonk, William H. Onion, Isaac Oppenheim, Leopold Oppenheimer, Marcus Oppenheimer, Joseph Oppenheimer, Edwin B. Orcutt, Joseph U. Orvis, Samuel S. Osborne,

John N. Osborne, Wm. H. Osgood, James W. Osgood, Solomon Ottenheimer, Chas. B. Owen, Fred. N. Owen, J. Paton, Wm. A. Paton, F. Pulver, Geo. W. Parsons, Edwin Packard, Rev. Chas. C. Parsons, Elisha A. Packer, Benj. C. Paddock, John K. Porter, August G. Paine, William Palen, Chas. Partridge, Francis H. Palmer, Jeremiah Pangburn, Jas. W. Palmer, Jr., Ario Pardee, Sherman Paris, Lemuel W. Parkes, Gouverneur Paulding, Herman Passavant, Henry Pastor, Ebenezer Palmer, Samuel W. Patchen, Robert W. Paterson, Wm. Paton, Jas. P. Paulding, Wm. T. Peek, John M. Pendleton, Oliver H. Perry, Wm. H. Phillips, Edmund Phinney, Geo. W. Pier, Junius J. Pierce, Henry Pigott, Wm. E. Pine, John R. Pitt, Geo. T. Plume, Wm. L. Pomeroy, Augustus D. Porter, Nathan T. Porter, Charles C. Pratt, Sam'l B. Potter, Lawrence Powers, Daniel R. Pratt, John Q. Preble, Andrew M. Prentiss, Edwin A. Priest, Joseph Purdue, Wm. B. Putney, A. J. Roe, Wm. H. Rackett, F. A. Ransom, Constantine P. Ralli, Chas. G. Ramsay, Aaron H. Rathbone, John P. Reed, Jr., Henry G. Reeve, Peter A. H. Renauld, James M. Requa, Jayne Reynes, C. H. Reynolds, Clinton G. Reynolds, John H. Rhoades, Chas. B. Richard, Thos. C. Richards, Josiah Richardson, Henry A. Robbins, Edwin B. Robbins, John T. Robin, Eugene N. Robinson, Jacob C. Rogers, Robert B. Roosevelt, Arthur B. Ross, John S. Rossell, Frank Rudd, Cornelius A. Runkle, Nathan Russell, Jr., Wm. F. Rowland, Wm. W. Rose, Jr., Orrin Skinner, Lewis Sanders, Wm. E. Stiger, Henry M. Sacks, Abraham O. Salter, N. S. Simpkins, Thomas P. Salter, Andrew H. Sands, Jos. S. Spinney, Sam'l B. Sandford, Jas. Sargent, Russell Sage, Sam'l W. Saxton, Wm. H. Saxton, Andrew H. Schanck, Rev. Noah Hunt Schenck, D. D., Wm. Schaus, Thomas E. Stewart, Warren Sawyer, Benj. M. Stillwell, Theron Strong, Edw'd Solomen, Otis D. Swan, Rob't Sewell, J. W. Schermerhorn, H. C. Southworth, S. H. Stern, Jos. L. Taintor, C. F. Timpson, Wm. T. Tannahill, Commander Edw'd Terry, U. S. N., Jas. John Tapscot, Alfred J. Taylor, Geo. A. Telford, Arthur Thompson, H. P. Talmadge, Wm. H. Thorne, John A. Tooker, John Tracey, Jr., Henry E. Tremain, Robert A. Tucker, Edwin O. Tufts, Herbert B. Turner, Henry F. Vail, James H. Wood, C. D. Wood, Charles C. Waite, Christopher Wolfe, Sam'l Wilkson, Seymour Willard, Jonn H. Watson, James L. Worth.

No ballot being called for, the above-named gentlemen were elected Fellows of the Society.

Lieut. Henry Clay Cochrane, U. S. M. C., was then introduced to

the Society by the President, who read a paper on the "Ascent of the Misti."

Dr. I. I. Hayes, in moving a vote of thanks, offered the following resolutions:

Resolved, That the thanks of the American Geographical Society be extended to Lieut. Henry Clay Cochrane for his able and instructive lecture, delivered before the Society this evening, as an expression of our appreciation of his eloquent effort.

Resolved, That the Society, as a mark of its respect and regard for the HON. CHARLES P. DALY, its worthy and devoted President, on the eve of his departure for Europe, extends its thanks to him for his ability as a presiding officer, and that a copy of this resolution be spread upon the pages of the Journal of the Society.

The above resolutions were seconded by Mr. F. A. Stout, and unanimously adopted.

The meeting then adjourned.

Regular monthly meeting of the American Geographical Society, held at the hall of the Young Men's Christian Association, corner of Twenty-third street and Fourth avenue, New York, November 23d, 1874; Chief-Justice DALY in the chair.

The following-named gentlemen were recommended by the Council for election as Fellows of the Society:

NEW FELLOWS ELECTED: *November 23, 1874.*—Capt. Wilson Defendorf, Lieut. Edward Hunter, U. S. A., George H. Redding, Rev. J. M. Buckley, George J. Powers, Lieut. G. W. Coster, U. S. N., Ira E. Walraven, Gen. J. B. Kiddoo, U. S. A., Henry W. Bookstaver, Benjamin Wood, Benjamin Wood, Jr., Robert L. Fabian, E. R. Meade, George H. Wooster, Harlow M. Hoyt, Austen G. Fox, Walworth D. Crane, Charles C. Haight, Henry E. Pelley, S. Fenton, Jr., Fernando Wood, C. K. Randall.

No ballot being called for, the above-named gentlemen were declared duly elected Fellows of the Society.

It was moved and seconded that a committee, consisting of three persons, appointed by the Chair, be directed to prepare a memoir, to be read before the Society, on the life and services of the late Henry Grinnell. Messrs. Hayes, Stout and Brevoort appointed such committee.

Dr. I. I. Hayes made his report as the representative of the Society to the Iceland Millennial.

M. Paul B. Du Chaillu spoke of his recent experiences in Lapland, dressed in the costume of the natives.

Mr. Cyrus W. Field moved a vote of thanks to both speakers. Unanimously adopted.

Adjournment.

Regular monthly meeting of the American Geographical Society, held at the hall of the Young Men's Christian Association, corner of Twenty-third street and Fourth avenue, New York, December 23d, 1874; Chief-Justice DALY in the chair.

The following-named gentlemen were recommended to the Society, by the Council, for election as Fellows:

NEW FELLOWS ELECTED: *December 23, 1874.*—J. A. Striker, Archibald D. Russell, Charles S. Brown, Henry P. Egleston, Walter Stanton, Lyman Rhoades, Edward King, David King, Lieut. W. H. Brownson, U. S. N., Robert Jaffray, Charles Sharpe, John Mortimer Murphy, Lewis King, J. G. Dudley, Major H. C. Dane, George Jones, Charles A. Piercy, Arthur F. Bowers, Charles Miller, Edward B. Heydecker.

No ballot being called for, these gentlemen were declared duly elected.

Lieut. G. M. Wheeler, U. S. Engineer Corps, read a paper on "Western Exploration," divided as follows: Historical resumé of Western exploration; Labors of his expedition for 1874; Importance of the survey from a national and popular standpoint.

Dr. I. I. Hayes moved a vote of thanks. Carried.

Mr. Smith E. Lane moved the appointment of a committee by the Chair, to nominate officers for the ensuing year. Adopted. Messrs. Lane, Judge Davies and B. F. Reinhart appointed such committee.

Adjournment.

ALVAN S. SOUTHWORTH,
Recording Secretary.

PART II.

PAPERS READ BEFORE THE SOCIETY.

(NOTE.—THE AUTHORS ARE ALONE RESPONSIBLE FOR THE CONTENTS OF THEIR RESPECTIVE PAPERS.)

I.

ANNUAL ADDRESS.

BY CHIEF-JUSTICE CHARLES P. DALY, President.

SUBJECT: THE GEOGRAPHICAL WORK OF THE
WORLD IN 1874.

PHYSICAL PHENOMENA OF THE YEAR.

The physical occurrences or phenomena of the past year have been atmospheric disturbances, such as typhoons, cyclones and hurricanes, unexampled for many years in their violence and destructive effects. Great rain-falls in certain parts of the earth followed by enormous and damaging floods. The falling in certain localities of unprecedented masses of snow. Extreme cold during the past and present winter, and earthquakes and volcanic disturbances considerably distributed, but with one exception, not as violent in their character, nor as injurious in their effects, as the like phenomena in the past few years. Of these I may mention the great typhoon which on the night and morning of the 22d and 23d of September last, swept over Hong Kong, involving the loss of more than eight thousand lives and the destruction of a vast amount of property. The cyclone in November which passed over this country from the Gulf states to the Lakes and along the Atlantic coast from Virginia to Nova Scotia, destroying half of the town of Tuscumbia in Alabama. The storms along the New England coast in May. The storms, tornadoes, and extraordinary rain-falls throughout the southern and middle states in June and July, attended by the great floods at Pittsburg and Alleghany city, by which two hundred lives were lost, and by the tornadoes which destroyed the town of Tampico in Illinois, and produced the loss of life and property in the valley of the Juniata. The hurricane in Jamaica. The disastrous storm on the coast of Nova

Scotia and the terrific gales on the coast of Great Britain and Scotland. The damage done by the rise of the Thames in March, and the destruction of plantations in April, by the rise and overflow of the Mississippi. Destructive floods in India, in August, and in the same month the great flood at Lorida in Spain which swept away two hundred habitations. The immense snow-fall in Persia, which extended over the whole country, accompanied by a winter of extraordinary severity, succeeded by a spring and summer when the rain-fall reached the unparalleled height of twelve inches, the height before seldom exceeding two inches; which was followed by the overflow of the Tigris, and the great flood in Bagdad in which many persons were drowned, and by the floods that destroyed one-third of Shiraz and injured other towns.

The great severity of the winter of 1874 and 1875, in the whole of northern Asia. The falling of great masses of snow during the present winter in the Alps, the Pyrenees and in Spain. The unusual number of icebergs seen in the Atlantic. The hail storm in Southern France, extending over two hundred miles, with a breadth of two miles, which was of great severity and caused much injury, the hail stones being as big as marbles.

A slight eruption of Mount Etna, a continuation of the eruption of Manua Loa in Hawaii, the destruction by an earthquake of Antigua and some smaller towns in Guatemala, and shocks or disturbances from earthquake in Vera Cruz, St. Thomas, Equador, Porto Rico, Mexico, Utah, North Carolina, Scotland, Innspruck, Smyrna, Constantinople and Ceylon.

The great typhoon at Hong Kong is the most striking of these events. It was remarkable for its violence, its rapidity and its destructiveness. Hong Kong during the past fifteen years has been visited by five most disastrous typhoons, but they all sink into insignificance before the fury of this one, which moved at the rate of forty miles an hour, being double that of the West India hurricanes. The destruction of human life was so rapid and enormous that no approximate estimate could be made, and it has been put down by some even as high as thirty thousand. Every ship in the harbor was injured. One hundred junks foundered almost at the same time, and the destruction of property, which is estimated at more than five millions of dollars, was so great, that the city, when the typhoon was over, looked like a town that had been long and heavily bombarded, in every direction.

The great rain-fall in Persia is also remarkable, for Persia has been, for the last few centuries, a country that was constantly becom-

ing more arid; where the supply of water was annually diminishing, and where the continuation of extensive works for its preservation and distribution by irrigation has long been going on as a matter of imperative necessity.

METEOROLOGY.

The knowledge which is now so readily and so quickly obtained of such occurrences over a wide portion of the earth's surface, as well as of their exact character, has given an increased impetus to and greatly advanced the science of Meteorology. Predictions of approaching atmospheric disturbances, or, as they are called, "weather predictions," by scientific men, have been verified in so many instances, that it may now be stated to be within the power of science to anticipate these occurrences and thereby, to a considerable extent, to guard against their effects. The belief is now becoming prevalent that they are connected with magnetic disturbances and with the changes that take place in the spots upon the sun, and much is anticipated from a closer study of terrestrial magnetism and from the discoveries that have recently been and are continuing to be made in solar physics.

This theory, that as the sun's spots enlarge, the rain increases over a wide area of the earth's surface, and that it diminishes over a like area as the sun's spots are reduced, has, during the past year, been strengthened by observations made at the Mauritius and by Mr. S. W. Dawson's observations that the fluctuation and change of level in our great northern lakes seems to correspond with the movement of the sun's spots.

The observations making and recorded in India have become of the greatest importance in the advancement of this science. From the great number of stations and the data collected, it will soon be possible to form a conception of the geographical distribution of pressure, temperature, rain, etc., over one-half of India and its seas. The discussions respecting the deficient rain-fall in the Presidency of Bombay, so disastrous by the great famine which followed it, has led to the announcement of a principle which, if confirmed by future observation, will make it possible to predict to some extent the nature of the Indian seasons.

THE EARTH.

The year has been distinguished by a very important event, the transit of Venus, the observations of which, though designed chiefly for astronomical purposes, are also of geographical interest, as they are made to ascertain the distance of the earth from the sun. All

the results are not yet known ; but the observations made are sufficient to show that the distance is less than was heretofore computed ; that it is about 92,000,000 of miles.

In respect to observations having relation to the earth generally, Mr. H. Howarth during the year has expressed the belief that the earth is slowly and gradually shrinking at the equator and correspondingly thrust out toward the poles, which he attributes to earthquakes and volcanic action, the chief seat of which disturbances lies within a belt bounded by the 20th parallel on either side of the equator, and Mr. H. V. Hind, of Nova Scotia, has called attention to the fact, that somewhere between longitudes 13° and 41° east of Greenwich, the major equational axis of the earth is now about two miles longer than the equational axis at right angles to it ; that at a former period it may have been greater, and to the effects that would follow if the bulge varies according to a regular law.

POPULATION OF THE WORLD.

An estimate of the population of the world was made during the year by Messrs. Behm and Wagner, who fix it at 1,391,030,000.

SCIENTIFIC VOYAGE OF THE CHALLENGER.

The Challenger, of whose scientific voyage of exploration around the world, I have previously given an account, has been, during the early part of the year, in the Antarctic circle, which she crossed last February, and after visiting and examining many islands, she has, during the residue of the year, been exploring in the Eastern Seas and the Malay Archipelago, with very satisfactory results. A correspondent from the ship in the *London Times* describes the bottom of these Eastern seas, from the sounding of the Challenger, as being a chain of sunken lakes or basins, cut off from the upper and neighboring water by their surrounding rims or borders, as lakes are upon the land. That the mass of water lying in them having thus no means of communicating with the upper and outer water above, remains of the same temperature, and that consequently the cold currents traveling from the Antarctic do not obtain admission, but pass over these lower basins or lakes. Indeed the more fully we explore the depths of the ocean and trace the configuration of the surface of the earth beneath the sea, we find that it has the same general features as it has upon the land, mountains, valleys, gorges, chasms, precipitous banks, and other irregularities, hid from our view by the waters that cover them, the nature, extent, form and variety of which, are revealed by the deep sea soundings now so extensively

carried out. These inequalities of surface of the ocean bottoms have more to do than has been hitherto suspected with the direction of ocean currents, as mountains and valleys have upon the land with the direction of the wind. As the facts accumulate from these deep sea soundings, we shall be enabled to map the bottom of the oceans as we have mapped the surface of the dry land, and the time will come when we shall give names to prominent places beneath the waters, that we may distinguish and refer to them as we now give names to the mountains, great valleys and lakes upon the land, or map out and distinguish by their names the inequalities upon the surface of the moon. Such is the progress of physical geography, Geography beneath the waters has but just begun.

THE SEA AND OCEAN CURRENTS.

Mr. J. Prestwick has collected and arranged tables of the temperatures of the sea in various depths, as observed from 1749 to 1868, by which he has arrived at some general conclusions, which in the main agree with Dr. Carpenter's, especially in respect to the flowing of a cold current along the ocean's bottom from the pole to the equator.

Dr. Carpenter is still earnestly advocating his theory of oceanic circulation which I explained on a former occasion. In an address last summer before the British Association at Belfast he stated that his theory had been anticipated by a Dr. Lenz of St. Petersburg as long ago as 1845, but that his own conclusion had been formed independently, without any knowledge of his predecessor's investigations. Dr. Carpenter finds that the result of the examination of the temperature of the ocean by the Challenger in her exploration along the length and breadth of the Atlantic confirms his theory that there is a constant flow of cold water from the polar regions to the equator, which, reducing the ocean level at the poles, causes an indraught of the warm surface water of the Atlantic to flow toward the poles from the equator, thus producing a horizontal circulation which completes itself and accounts for the Gulf Stream and other phenomena connected with the currents and the course of the trade winds.

Mr. Croll, the scientific antagonist of Dr. Carpenter, on the other hand maintains that all the movements of the waters of the ocean, the deep as well as the surface water, are produced by the action of the winds upon the surface in connection with the motion of the earth, and that the deep current that is now known to flow from the pole to the equator is the reflux of the current driven by the winds to the poles.

Captain Schilling of the Russian Navy has published his views

respecting ocean currents, and has come to the conclusion that none of the theories that have been advanced are consistent with the facts. He considers that both atmospheric and ocean currents are subject to general laws and disturbed by common causes, which he says are the variation in the weight of the water, and the atmosphere, the revolution of the earth upon its axis and the attraction of the sun and moon. He does not believe that the equatorial currents are produced by the trade winds, although they may increase the rapidity of the currents at the surface, and he thinks that those which flow parallel with the equator are due to the attraction of the sun and moon.

The charts of the winds and currents of the Pacific, Atlantic and Indian Oceans compiled by Captains Evans and Hall, and published during the year, are a most valuable acquisition, as they have been very carefully prepared, and show for the four seasons the pressure, winds, and temperature over the parts of the globe covered by the sea.

ANTARCTIC.

Mr. L. Martinet has during the year drawn attention to the region of the Antarctic Circle. He maintains that the general impression that the Southern Pole is the coldest is erroneous, and that certain experiments of Prof. Tyndall warrant the belief that a warmer temperature exists there. This, it may be remembered, was also claimed upon other grounds by the late Capt. Maury, in a communication addressed to this Society many years ago.

GEOGRAPHICAL WORK IN THE UNITED STATES.

Of the geographical work of the world during the year I shall begin with that of our own country. That most important work, the Coast Survey, has been continued. The Smithsonian Institute has during the last, as in every year, prosecuted those inquiries that are so valuable, and have given it as a national institution, its high character, and the Hydrographic office, together with its other general work, has continued the publications for the preservation and diffusion of knowledge respecting the ocean and its navigation which are so creditable to our government.

U. S. ENGINEER CORPS.

The labors of the Engineer Corps during the past year fill two bulky volumes, comprising the report of its distinguished chief, Gen. A. A. Humphreys. The geographical work embraces the improve-

ment of harbors and rivers, the survey of transportation routes to the sea board, the survey of the mouths of the Mississippi river with a view of obtaining a sufficient depth of water for the construction of a ship canal from the river to the Gulf of Mexico, or the deepening of its natural outlets to the Gulf, the present outlets being wholly insufficient to meet the wants of the increasing commerce of the West. Examinations for a permanent plan for the reclamation of the alluvial basin of the Mississippi river now subject to inundation; the continuation of the survey of the northern and north-western lakes; surveys for military maps; surveys for the irrigation of some of the great valleys in California; geological reconnoissances in parts of Western Nevada and adjacent California, and geographical explorations in the great west, by the various expeditions under Lieut. G. M. Wheeler, Major J. W. Barlow, Capt. W. A. Jones, Lieut. E. H. Ruffner and Capt. W. Ludlow.

These labors have extended over the whole country from the Atlantic to the Pacific oceans, and are so vast in their details as to preclude the possibility of my doing more than to refer to some of them, and even then only in the most general way.

LIEUT. WHEELER'S EXPLORATION.

Lieut. G. M. Wheeler's survey west of the 100th meridian has been a continuation of the same general labors that have been prosecuted in this survey since 1869, and which during the last year have covered an area of seventy-five thousand miles. Much of the work done has been topographical, with which, however, has been connected geology, mineralogy, natural history, and the gathering of facts bearing upon the industrial resources of the country. The geological labors extended over the "Colorado plateau" region, a large portion of which is drained by the Colorado and its tributaries, and which, from its step-like table lands, its gorges and canons, is of great interest to the geologist. The geographical labors have comprised a study of the erosion of running water, by which canons are produced, and contrasting it with the erosion by rain or by the drifting of sand, and a study of the origin of mountains and of volcanic phenomena. Lieut. Wheeler says that every State and Territory west of the plains is crowded with the products of volcanic action, ancient and modern. In southern Utah the connected beds of lava cover an area of five thousand square miles, and an area of the same character in Arizona and New Mexico spreads over twenty thousand square miles. The conclusions of the geologists of the expedition, from their observations, are that volcanic disturbances and eruptions in our western

territory will be again resumed and may occur at any day; that they have occurred so recently, geologically speaking, that it is extraordinary that there is no human record of them. Another object has been the study of the glacial epoch in this part of our continent, and the southern limit of our ancient system of glaciers has been ascertained through the entire extent, in longitude, of the survey. Large collections have been made in mineralogy, paleontology and geology. The collections in natural history have been unusually extensive; the results, especially in botany, it is said, have never probably been exceeded by any exploring or surveying expedition in the west.

A writer in the *New York Times*; attached to the expedition, has given an account of interesting portions of the country in the vicinity of the canons, and of the remains of the habitations of the races that formerly peopled it, and of interviews had with the Ute and Pueblo Indians. He describes a country in his northward route from Carri-zeto canon as a wonderful country, from the great beauty of its wooded hills, its reedy lakes, and rills of pure cold water; and another region through which the river Chama flows, of the average altitude of 9,000 feet, which he describes as a garden spot, the finest, most attractive, and romantic he ever saw;—its numerous valleys, covered with the finest grass and penetrated by swift creeks, filled with trout, and embraced by gently-sloping, well timbered hills, with here and there a high peak. He also observed that the temperature of the springs and creeks was from ten to twelve degrees higher than other plateaus of equal altitude, and makes the pertinent remark that now that we have begun to investigate the temperature of the ocean at certain depths, it would be as well also to study that of the waters at different heights. The Ute Indians were opposed to any exploration of their country, as they did not want the white man to settle on their lands, and scare away the game. He was present at an interview with them, and describes the dandy of the tribe, who strutted about that he might be sufficiently admired, and the sub-chief, who was a cynic, with a thin, pock-marked face, and a solitary eye, so small, black, and penetrating as to be absolutely fascinating. When spoken to upon the subject of religion, he said he knew nothing about God; that he did not believe that there was any one greater than the Great Father, the President, at Washington. With a keen, sardonic look, and a twinkle of his one eye, he said that the Mexicans and the Americans had water put upon their heads (baptism), but it seemed to him that it did them no good, and it was of no use to an Indian. He remarked that the Utes did not worship any thing, but that they deferred to the sun, and asked the explorers if they had

ever heard of Montezuma. The writer examined several of the remaining dwellings of the race that formerly occupied the country, by some supposed to have been the Aztecs. They are generally down on the sides of the canons, or on rocky elevations or projecting ledges, or like places of security. They are square stone buildings, with walls of about twelve inches thick, cemented by adobe clay, two stories high, with four rooms, having square holes cut through the partition walls, large enough for a person to pass by, stooping very low. These buildings have no place for entrance upon the first story, and are accessible only by a ladder. They are so placed as to command the view both up and down the canon, and to be in view, also, of each other, that warning might be given by smoke or other signals upon the approach of enemies, being, in fact, a chain of signal stations throughout the canons, the larger ones serving as centers of strength or garrisons from which the smaller ones might be reinforced — the arrangement of a pastoral and semi-civilized people for protection against the fierce, war-like tribes that surround them on the east and west. The mesas on the top at a former time afforded pasturage for the flocks of a numerous people, now reduced to a mere remnant by war and other causes, chief among which has been the gradual failure of a supply of water.

The Pueblo Indians were visited, but they have frequently been described by other explorers. They have intermixed by marriage with the Utes, Navajos and Apaches, but still retain their severe laws against dishonesty and immorality, as well as their ancient religious faith; and every morning and evening go up to the house-top, and chant to the sun a mournful, musical song in the minor key, and apparently in monosyllabic words. Dr. Yarrow listened to it day after day with delight, but was unable to get it.

MAJOR BARLOW'S EXPEDITION.

Major Barlow's labors have been in the military division of the Missouri and have embraced surveys for military and geographical purposes, astronomical observations; the determination of the latitude and longitude of places in Dakota, and the completion of maps embracing the Yellowstone river, Eastern Mexico and a part of Texas and the continuation of the New Map of the Western Territories.

LIEUTENANT RUFFNER'S LABORS

were also in the department of the Missouri, and consisted largely in the collection and arrangement of information derived from scouting parties in the field, the total mileage covered by the journals of the

officers and men being 22,903. Surveys were also made for roads in Colorado, Arizona and New Mexico; and the military road from Santa Fe to Taos, New Mexico, was completed.

CAPT. JONES' EXPLORATIONS.

Captain W. A. Jones' explorations and surveys have been in the department of the Platte. They have consisted in the collection of geographical information and the embodiment of it in maps, and a field reconnaissance in the country about the head waters of the Yellowstone and other rivers; an excessively mountainous area, lying in the north-western corner of Wyoming Territory, and as yet but little explored. The region is one of rare interest to the student of physical science, and the report of the reconnaissance, besides being a descriptive journal, treats also of the geology, botany, meteorology, entomology, the mineral and thermal waters, and the physical and general geography, of the region. A new route to the Yellowstone Park and to Montana was discovered, and the outlines and character of a remarkable range of mountains, the Sierra Shoshone, lying between the valleys of the Yellowstone and the Big Horn, were ascertained. The range was crossed for the first time by the party, being previously almost unknown, and two passes through it were discovered. A general map of the region traversed was also compiled from the latest reliable data.

CAPT. WM. LUDLOW'S EXPEDITION.

Capt. Ludlow accompanied Lt. Col. Custer's military expedition for the exploration of the unknown country lying principally in the western and south-western portion of Dakota and the eastern part of Wyoming. The expedition left Fort Lincoln on the 2d of last July, with the assurance by the guides they would be opposed by a hostile force of Indians, and that they would never penetrate the fastnesses of the Black Hills; but during the whole route of nearly 1,000 miles not a hostile Indian was seen, and the Black Hills were thoroughly explored, the expedition returning to Fort Lincoln on the 30th of last August. The country first traversed resembled other portions of Dakota, an open prairie with a fair amount of grass, wood being scarce and water not always to be found. On the 20th of July they crossed the Belle Fourche, and found themselves transported to a new country. The whole character was changed. There was an abundance of grass, of timber, small fruits, flowers, and an ample supply of pure cold water. They penetrated to the heart of the Black Hills; valley leading into valley, until they reached the beautiful park

country, marked unexplored upon our maps, of which they had heard much, but hardly hoped to visit. They reached Harney's Peak, a lofty granite mass, 8,000 feet above the level of the sea, and surrounded by craggy peaks and pinnacles. Here scouting parties were sent out and an exit was found by another route, better than the one by which they came.

Capt. Ludlow says that the region of the Black Hills is admirably adapted for settlement; that it abounds in timber and grass; that there are flowing streams and springs of pure, cold water everywhere; that the valleys slope gently and are ready for the plow; that the soil is of wonderful fertility, as shown by the luxuriance of the grass and the profusion of flowers and of fruits; that the climate is wholly different from that of the plains, being cooler in summer, and more moderate in winter. It is not subject to drouth, as the night dews are very heavy; nor liable to excessive rain-fall, for in narrow valleys no indication of overflow could be detected. Game is abundant. The zoologist, Mr. Grinnell, says that, as a game country, it will compare very favorably with any in the United States. Almost all the streams passed were dammed by the beaver, and fresh tracks and signs of the animal were constantly seen.

U. S. GEOLOGICAL AND GEOGRAPHICAL SURVEY OF THE TERRITORIES.

This survey, under Professor F. V. Hayden, with whom is associated Mr. J. T. Gardner, as the head of the Geographical Department, has been engaged from July to September in the mountainous region of Colorado, the accurate mapping and geographical work of which has been extended over 16,000 square miles in the west and southwestern portions of the Territory. The survey of this year has confirmed the discovery of 1872, that Colorado is the great center of elevation in the United States. In the preceding year twenty-six peaks of the average height of 14,000 feet were measured, and this year twenty-four have been added to the number, making in all fifty peaks in Colorado that are about 14,000 feet high, the highest being Mount Harvard, 14,383 feet. Mount Whitney, in the Sierra Nevada, is higher—14,880 feet; but the number of great peaks in California is small as compared with Colorado. In one region, at the head of the Rio Grande and Animas rivers (between meridian $107^{\circ} 15'$ and 108° , and latitude $37^{\circ} 30'$ and 38°), which is about 35 by 40 miles, there are no less than twenty peaks of the average height of 14,000 feet, and nearly one hundred that average 13,000 feet. The sides and spurs of these great peaks are cut by hundreds of quartz veins, bearing gold and silver in large quantities, many of

which, the geologist of the survey thinks, will by washing yield rich returns. Accurate maps and the reports that have been and are to be made of a country so difficult of access, will be of the greatest importance to its development. The scenery of this region is grand and imposing. Its narrow mountain valleys are flanked by peaked ridges from three to four thousand feet high, the summits of which, except in July and August, are covered with snow. South of this mountainous region the country falls off into low plateaus, through which the streams descending from the mountains have worn valleys, which were once the home of a prehistoric people considerably advanced in civilization and the arts, but of whom nothing is known, except the ruins that have been discovered. In a canon, never before explored, of the Rio Mancos, a branch of the St. Juan, in the extreme south-western portion of the Territory, many houses were discovered by the survey, built in the cliffs, which rise 1,000 feet above the valley of the river, most of them in ruins, but some well preserved, of which photographs were obtained with difficulty. One of them (a stereoscopic view of it was here shown) is a dwelling-house, two stories high, built of smooth-faced stones, laid in mud mortar, and with well-constructed windows, that were formerly glazed with mica. The ends of the beams which had supported the floor and the roof were still in the wall, and the whole structure showed not only skill, but taste; the interior being plastered and the walls paneled in red with a white border. It is built on the shelf of a precipice which is 600 feet above the bed of the river. These houses were the homes of an agricultural people, who could exist only upon the scattered spots or oases of that barren country; while wild hordes roamed through the wilderness that surrounded them. That they were driven to these cliff dwellings in the canons for security against the predatory and warlike tribes east and south of them is inferred from the explorers finding in a valley at the west of the canon the ruins of a city, built of stone, which was nearly a mile square. It was surrounded by a wall that was fifteen feet in thickness, and flanked at the angles by towers for defense. The wall was faced with dressed stone, laid in regular courses, and imbedded in mortar. The inside of the wall had been left in the rough state, and over the ruins in the interior large trees had grown up, as natural monuments that indicate the time that must have elapsed since this carefully built city was peopled by human beings.*

* NOTE.—Photographs have been taken of all these ruins, and their investigation will be followed up during the coming season. A physical atlas of Colorado, in six sheets, upon a scale of six miles to the inch, will be published by the survey,

PROFESSOR POWELL'S EXPLORATIONS.

Prof. Powell's report of the survey of the Colorado appeared last April. The region surveyed is, in a geological point of view, one of the most interesting in the world; the river and its tributaries traversing those canons or great chasms, some of which are more than a mile in depth, below the general surface of the region. The report contains a general summary of the entire work: the geographical description of the country, its arable valleys, its supply of water, the extent of timber and pasture land, and its mineral products; the geology of the region; its natural history, and, lastly, an exceedingly interesting account of the races that peopled it, their customs, mythology, poetry, and arts. About 45,000 square miles has been already surveyed, and half of the region mapped.

PROFESSOR MARSH'S INVESTIGATIONS.

Professor Marsh returned last December from his fifth expedition for the exploration of the fossil region of the Great West. He has had no less than eleven different parties during the year engaged at various points in the Rocky Mountains under his direction, and a larger amount of fossils have been brought to Yale College than has been collected by all the other museums in the country. The remains of the animals found during the year are all of a tropical species and widely different from any now living. They were imbedded in the basin of an ancient lake of the Miocene period. He considers his last expedition as the most important in its results of any yet undertaken, and when these deeply interesting remains shall have been studied, a flood of light will be thrown upon the past physical history of the world, and, in connection with other researches, upon the plants that flourished, and the animals that existed upon our own continent at a very remote period of time.

PACIFIC OCEAN.

Commander G. E. Belknap, charged with ascertaining a practicable route for a telegraph cable between Japan and Puget Sound, carried on a series of deep sea soundings in that part of the Pacific Ocean, which are of the highest interest, as they confirm the great depth of the Pacific and the powerful action of submarine currents. The ocean bed along the route examined was very irregular. The water

showing in detail the geology, topography, and the distribution of forest, grazing, agricultural, and mineral lands. A bulletin has also just appeared, giving an account of the ruins.

deepens rapidly the moment the land is left. The sea bottom between the Aleutian islands and Kamchatka forms a ridge, the highest part of which is 1,777 fathoms beneath the surface; 80 miles further out the unlooked-for depth of 4,037 fathoms was found, while 30 miles further on, the depth was only 2,763 fathoms. These soundings disclose a range of submarine mountains, apparently of volcanic origin; a trough, which it is supposed the Kuro Siwo, or warm Japanese current, has cut through the rocky bed of the Pacific, and a broad plateau, or table, reaching from Vancouvers island to the Aleutian group. The soundings of the Tuscarora have been continued by Commander Erben, to ascertain the suitableness of the ocean bottom for a telegraph cable from San Francisco to Honolulu, in the Hawaiian islands, and the result is that it is suitable over the whole distance, from its almost-unvarying soft, oozy bottom.

ALASKA.

M. Pinvert has been engaged for two or three years past in geographical and ethnological investigations in Alaska and the Aleutian islands, the details of which he laid last summer before the French Geographical Society, who awarded him their gold medal.

Of his geographical labors or knowledge I cannot say much in commendation. He has claimed as his discoveries and given names to places already existing upon Russian maps, and which are found upon our own charts in 1846, and the Archipelago which he has named after the statesman Thiers, excepting what was already known, does not exist. His ethnological researches are entitled to more consideration, for he has a remarkable faculty for the acquisition of languages, and has, no doubt, in his communications with the various tribes inhabiting the regions traversed by him, acquired much more information than an ordinary traveler would obtain. He is of the opinion that the Esquimaux inhabiting this region are of the same stock as those of Greenland and Baffin's Bay, and his conclusion from their legends and traditions is that they came originally from a country in the south of Asia, where cold, storms, and the art of navigation were unknown. He supposes that their ancestors were driven by war from their Asiatic homes, and that a portion settled in the Aleutian islands, and another portion crossed Bherings Straits and separated into two branches; one of which went across North America and peopled Labrador and Greenland; whilst the other went along the Pacific coast as far as Mount St. Elias. Before conclusions so extensive as these can be accepted, it will be necessary to know upon what they are based. Mr. W. H. Dall, who, in connec-

tion with our coast survey and the Smithsonian Institute, has been engaged for several years in explorations and investigations in Alaska and the Aleutian islands, and who is a careful observer, has found nothing to indicate an Asiatic origin, but, on the contrary, from the remains he has found, and from what he knows of the currents in this region, he doubts the probability of there having been any such emigration from Asia in the direction which M. Pinvart supposes. Many American ethnologists moreover think that Greenland and the adjacent shores of North America were peopled from Europe.

W. H. DALL'S EXPLORATIONS.

Mr. Dall's labors during the present year have been along the coast from Cape Spencer to Mount St. Elias, the whole of which has been examined, and many grave errors corrected. The coast was found to extend from four to seven miles further west than as delineated upon our present maps. The region is one of extensive glaciers, which have been examined and mapped for the first time. Twenty-four positions were determined, 17 manuscript maps made, and 4,000 astronomical and 900 magnetic observations taken, which, together with miscellaneous ones, amount in all to about 12,000. The curious caves, previously explored, were re-examined, new shell-heaps have been found, and many thousands of ethnological specimens were brought to Washington. In the collections now there of McFarland, Kennicutt, and Dall, we have a larger collection of ethnological material relating to the western Esquimaux than there is in all the other collections of the world put together. Some additional facts should be added to my former statement of Mr. Dall's investigations, which are: that the shallow basin of Bherings Sea, at the north-west point of Oonalaska, dips suddenly down from 60 to 800 fathoms; that, further north-west, the bottom slopes down to 1,100 fathoms; and that the theory of a current flowing around Bherings Sea in a circular direction is without foundation.

As the Society took a very active part in urging the negotiation on the part of Mr. Seward for the purchase of Alaska, and as there were many then who thought we were paying a very large sum for a useless territory, it is gratifying to be able to state that the income now derived by the Government from this territory, after payment of all expenses, is greater than that from any other territory, and will in twenty years extinguish the debt. The southern portion of Alaska has a comparatively mild climate, and is capable of maintaining a large population. Potatoes, barley, rye, and probably oats, can be cultivated; its agricultural resources being about the same as Norway

or the Orkney Islands. It is an immense timber region, with great facilities for transportation, and it will continue for a long time to supply the products of fur-bearing animals, provided this branch of industry is properly protected.

ANCIENT INHABITANTS OF NORTH AMERICA.

Professor F. W. Putnam, of Salem, Mass., has been engaged in researches respecting the ancient inhabitants of North America, and has made some exceedingly interesting explorations of caves, mounds, fortifications, and other remains of the unknown, prehistoric people who, at a remote period, occupied Ohio, Indiana, and adjacent parts of the West, usually referred to as the Mound Builders. He believes that the southern Indians were not connected with the northern or eastern tribes, but belonged to older inhabitants of the country, much farther advanced in the arts of civilization; in other words, that the southern Indians, the Mound Builders, and the ancient inhabitants of Mexico were of the same original stock, although greatly diversified by immigration and by mixing with other races by whom they were conquered and absorbed. Ohio and Indiana are especially rich in relics of these widely separated families. Near Lexington, Indiana, he found the remains of an ancient camp or town, protected by a palisade, connected with which was a "refuse circle," composed of the remains of pottery and the bones of animals. He found a "rock shelter" near Grayson Springs, Kentucky, in which were bones of animals, fragments of pottery, and bone implements. On small, shelving rocks at the back of this place of retreat and shelter were indications that cooked food had been placed on the shelves for use, and that the occupants had hastily left. He explored a cave near the Mammoth Cave in Kentucky, belonging to the same proprietor. In a small chamber, where the foot of a white man had never before trod, he found in the clay the imprints of feet, shod with peculiar moccasins or sandals of some braided substance, the naked heel and toes and the braided imprint of the sandal covering the rest of the foot, being as distinct and tenacious in the clay, as though imprinted but yesterday. He also found a number of cast-off sandals, finely made, of twisted leaves of some kind of rush, braided in an artistic way, resembling the mode of braiding straw sandals in China. In this chamber was also found a piece of cloth, regularly and finely woven, which had been dyed or colored in black stripes, and mended by darning, together with other objects of interest.

Between 1812 and 1815 bodies, buried with great care, together with other articles, were discovered in the caves of Kentucky and

Tennessee, among which bodies was one then widely known as the "Mammoth Cave mummy." These articles were supposed to be lost; but Mr. Putnam found them, though sadly neglected and many missing, in the collection of the American Antiquarian Society at Worcester, and was able to identify them as the same in material, design, and structure, with those left by the race occupying the cave he had explored.

A number of Indian crania have been obtained by Scientific members of the Wheeler Expedition at considerable risk from the Ute burial grounds and the valley of the Great Salt Lake, as well as ancient implements used by the aborigines.

A correspondent of the *St. Louis Republican* gives an account of the discovery during the year of extensive ruins on the Gila river, near Florence, in Arizona. He describes the principal ruin as a fortification of stone, 1,600 feet long and 600 feet wide, within which are the remains of a greater structure of roughly hewn stones, 200 by 260 feet, the wall in some places being perfect to the height of 12 feet. Two towers are standing at corners of the outer fortification, one 26 and the other 32 feet high, with indications that they were formerly much higher. He further states that a few copper implements, some stone utensils, and two rudely cut stone vases, like those of Central America, were found. These newspaper statements of discoveries of this nature, with which no responsible name is connected, are to be accepted with great caution, for they are frequently invented to puzzle the learned or to benefit the newspaper. Arizona, however, is a land of the ruins of a prehistoric race of whom we have no history or tradition, and there is nothing intrinsically improbable in the alleged discovery.

Mr. Thomas Croft, of Papeeti in Tahiti, has transmitted to the California Academy of Sciences, photographs of curious hieroglyphics in wood recently found in Easter Island, and which are supposed, from the vague tradition current amongst the inhabitants of the island, to represent the language of a prehistoric people, of which the present inhabitants are the degenerate descendants. Mr. Croft says that none but the priests and a limited few can decipher these hieroglyphics, and in another letter to the Academy, he says that he has found a native who can read them, and who is to teach him the language; that he will shortly be able to translate them, and he thinks that he has discovered the relics of a great Malayan empire that at some former period extended its power over the whole of this part of the South Pacific. Easter Island has long been an object of interest to archaeologists, from the fact that it is a small volcanic

island of about forty miles in circuit, with an iron-bound and almost inaccessible coast, without fresh water except such as falls from the skies, without wood for fuel, and destitute of domestic animals, except a few fowls; but upon which there are a number of colossal statues, some of them fifteen and eighteen feet high, erected upon platforms, which, though rude, display a knowledge of art superior to that of the present people of this part of the Pacific.

OTHER AMERICAN EXPLORATIONS.

What has been done in explorations for a ship canal across the isthmus was so fully laid before the Society by Lt. Collins, last spring, that it is only necessary for me to state that he has gone out this winter for a fourth and final exploration of the route by the Atrato, and that Commander Lull has also gone for the examination of what is known as the Garella route.

Dr. Harkness has examined an extinct volcano in Plumas county, California, three miles long and half a mile wide, which he thinks has been of recent origin. He also reports the discovery in the same part of California of a lake hitherto unknown to civilized man, which he says is 7,330 feet above the level of the sea.

Mr. N. H. Bishop has undertaken to explore the inland waters of the coast of the United States along the Atlantic coast, bays, inlets, etc., alone in a canoe, and when I last heard of him he had gone over a large portion of the coast.

Mr. V. Colvin has been engaged for the last two years in the survey of the Adirondack wilderness in the State of New York. He has found the source of the Hudson in a small lake 4,326 feet above the level of the sea, with the poetical name of "Tear of the Clouds." I regret that my limits will not admit of a more extended notice of his very valuable and interesting report.

CENTRAL AND SOUTH AMERICA.

Prof. W. M. Gabb, of Philadelphia, has for a year or two past been engaged in the exploration of an unknown part of Costa Rica, now occupied by savages. His object was to discover its mineral resources, a tradition existing that its mines had been formerly worked by the Spaniards. He has, however, also given great attention to the geological structure of the country, and has discovered two previously unknown volcanoes, about 7,000 feet high, and finds that the highest peak in the country is Pico Blanco, which he estimates at 10,700 feet. He has made collections of unusual magnitude in natural history, given special attention to the ethnology and philology of the region,

and is said to be now upon the track of an ancient buried city, of which no mention is made in any history of the country.

Mr. T. Belt has given, during the year, the results of his journey in the savannas, forests and ruins of Nicaragua. Much of it relates to natural history; but he has also collected facts bearing upon the glacial epoch, and assumes conclusions in respect to that period, which have, during the year past, been disputed by other geologists. He found, 3,000 feet above the sea, great blocks, which he infers to have been of glacial origin, being as he thinks due to land glaciers and not to icebergs. He goes as far as Agassiz in the theory of huge northern and southern ice caps extending from the poles toward the equator. If he is right in finding evidence of land glaciers in Nicaragua, it is a fact of great importance, which complicates the glacial inquiry, but by no means establishes the ice cap theory. He claims that this great ice cap extended over North America from the Pole to the 39° N. lat., and that from thence along the high lands of America to the tropics, and that in Central America, all the land 2,000 feet above the sea supported glaciers; that it descended to lat. 50° in Central Europe, and to lat. 52° in North-western Asia. Mr. S. F. Campbell, after observations made during thirty-three years, denies that there is any evidence of a continuous solid ice cap extending over the plains in Europe or America to or nearly to the equator; but, he says, there is a great deal to show ancient ocean circulation of polar and equatorial currents like those which now move in the Atlantic, and much to show the existence of large local ice systems in places where no glaciers now exist; which is substantially the theory of local glaciers in particular places maintained by Prof. Sterry Hunt in opposition to Agassiz and Geike, the Scotch geologist.

A very important part of Mr. Belt's work in Nicaragua has been the close observation of cyclones. He maintains, and very forcibly, that the received theories of the cause of cyclones are incorrect. He says that there is a complete gradation from the little eddy that stirs up the leaves, continuing through the large whirlwind and up to the most destructive hurricane, and that the mistake hitherto has been in forming theories respecting the larger, instead of carefully observing the smaller phenomena; which latter course he pursued and came to a conclusion as to the cause of cyclones, which is favorably received by eminent scientific men.

Prof. Lorenz, a botanist, who has been engaged in botanical explorations over a wide area in the lower part of South America, concludes, from the evidence supplied by the geographical distribution of the plants, that this part of South America was raised above the

ocean bed at a later period than the neighboring regions of Brazil and Chili.

A French expedition has been exploring Terra del Fuego. They found a large lake 25 kilometres in circumference, surrounded by luxuriant vegetation, and covered with wild fowl. The region was inhabited by a rude but hospitable people, the women being especially affable and obliging, one of whom exhibited a relic to which she attached immense value — the lid of a box of sardines.

An expedition has been organized for the exploration of the Peruvian mountains, and the inner Chancamayu, Perene and Tambo, to ascertain if they are navigable to the Amazon.

Captain Musters, R. N., the explorer of Patagonia, has been engaged during the past year in valuable geographical work in Bolivia, fixing the longitude of places and ascertaining the altitude of elevations, and Commander Cilley, a retired officer of our Navy, has also been engaged in Bolivia and Paraguay ascending rivers, ascertaining their true course and to what extent they are navigable.

Immense deposits of guano have been found on the Peruvian coast, north of the river Loa, which is the boundary between Peru and Bolivia. They are computed to amount to £52,000,000, being more than the public debt of Peru.

An important piece of information has just reached us from Brazil, that the government has requested Professor C. F. Hartt to submit a plan for the survey of Brazil. There is no country on the globe where a survey is more important, and under Professor Hartt, it would be in most excellent hands.

ARCTIC.

The Arctic event of the year has been the return of the officers and crew of the *Tegethof* of the Austrian expedition, and the important discoveries made by them. This expedition, in the difficulties it encountered, the perseverance displayed, the discipline maintained, and the success achieved, is about as heroic as any thing that has occurred in the history of Arctic exploration. I gave the details of this expedition in my address two years ago, up to the time, the 14th of August, 1872, when the *Tegethof* and *Isbjorn* parted company; the *Tegethof* under Lieutenants Weyprecht and Payer, to attempt the passage around Cape Tscheljnskin, and to the northern coast of Asia, to Behrings Straits. What has happened in other maritime expeditions, and what frequently happens in human life occurred. They did not accomplish what they undertook to do, but achieved something different, and of more interest, by being carried

into an unknown region, to a point farther north, than had yet been reached by man. The Tegethof shortly after leaving the Isbjorn was frozen in for 28 days, off the coast of Nova Zembla, and when the ice broke up, the party found themselves immovably fixed upon an ice floe, drifting forward and backward, and subject to the constant pressure of the surrounding ice, until the 13th of October, when the ice floe on which they were, crumbled away, and the vessel was forced up above the level of the ice on her larboard side, in which position she had to be supported all winter by props. It was a dangerous situation, in which she was constantly changing her position from the shifting and pressure of the ice. They had therefore to be ready to abandon her at any moment, and it required such unintermitting attention that the crew had but little opportunity for rest, and scarcely during the winter took off their clothes. The cold was so intense that they could not make any attempt to free the ship until the 15th of April, when they undertook to saw out a canal for the passage of the vessel, but it was in vain. After sawing in different places from twelve to twenty feet, to the water below, it was only to discover that there was still farther down another thick layer of ice, and the only effect of this unremitting toil was that the fore part of the vessel lay in a sort of dock, whilst the after part was fixed in ice of prodigious thickness. In this way she continued to drift to the north, until the 31st of August, when land was discovered ahead at a distance of fourteen miles. It was a lofty mass stretching far to the westward and northward in $79^{\circ} 43'$ N. lat., and $60^{\circ} 23'$ E. long., but the cracks in the ice were so numerous, that no landing could be effected, and for more than a month they were gazing upon this mysterious land without being able to set foot upon it. The vessel continued to drift to the north until in October she passed the 80th parallel, and finally, in November, the floe upon which she was immovably fixed was driven up upon an island of the coast which they called Wilezek's land, and was frozen in, in the place where she was finally abandoned. To use the language of Lieut. Payer, they were for fourteen months mere passengers upon an ice floe. The long Polar winter of 175 days now set in, when the cold was so severe that the quicksilver remained frozen for weeks, and the darkness in mid-winter was intense. In March, Lieut. Payer set out on a sledge expedition, to explore the new land, but little could be done, for the cold was still intense, every article of clothing was frozen like metal, and a strong rum lost all its potency and fluidity. A similar expedition, however, was undertaken on the 24th of March, and was more successful. The land, to which they gave the name of the Austrian

Emperor, Franz Joseph Land, is about the size of Spitzbergen. It resembles East Greenland, and is in two large masses, east and west; one of which they call Zichy, and the other Wilcez Land, after Count Wilcez, the arctic explorer and the munificent promoter of the expedition. They found it the most desolate land on the face of the globe. At the south-west the mountains rise to the height of 5,000 feet with vast depressions between, filled with gigantic glaciers. On the 8th of last April, the land exploring party reached $81^{\circ} 37' N.$ lat., and after traversing a glacier they came upon a country which they called Crown Prince Land, where they found the cliffs covered with thousands of ducks and auks; seals lay upon the ice, and there were traces of bears, hares and foxes. Here they found open water, and were greatly impressed by the grandeur and beauty of the surrounding scenery. Their furthest northern journey was on the 12th of last April, when they followed the coast to $81^{\circ} 57' N.$ lat., and over a sea comparatively free from ice, saw land in the distance, which seemed to stretch beyond the 83d parallel of North latitude; which land, the farthest known upon the globe, they most appropriately called after Petermann, the distinguished and indefatigable German geographer. On the 20th of May they had to abandon the vessel, leaving in her their journals, and with sledges and boats they undertook the return journey, which lasted over three months, the trials and hardships of which were exceedingly great; until at last, in the mouth of the Puhova river, they fell in, on the 24th of August last, with a Russian schooner, by which they were conveyed to Varsoe in Norway.

It is impossible to speak in terms too laudatory of the discipline, the high purpose, the calm courage and unyielding perseverance that distinguished this expedition on the part of both officers and men. Not a single instance of insubordination occurred, and the intelligence, patience and unity of action that was displayed, contrasts strongly with the vacillation, petty squabbles and ineffective discipline on board the *Polaris* on our own expedition.

The peculiar geographical circumstance in this expedition is, that in other attempts to reach the pole, where vessels have been caught in the ice and drifted, the drift has usually been to the *southward*; but in this case the *Tegethof* drifted *northward* to the place where she was finally frozen in and abandoned. Dr. Chavanne, in an article in *Petermann's Mittheilungen*, from this circumstance and meteorological observations and other facts which he enumerates, comes to the conclusion that the Gulf Stream is prolonged in this direction through the arctic, though submerged by the cold polar current over

a certain distance, when it again reappears and runs along the western coast of Asia near to the eastward of the New Siberia islands, where it meets the Kuro Siwo, or warm Japanese current, which flows through Behring's Straits, and that the two warm currents thus united lave the shores of the Arctic Continent, so as to render the existence of perennial ice there impossible. Capt. Bent went much farther than this in his theory, which was, that these two warm currents met at the pole, and produced there, by the warmth and mingling of their waters, an open polar sea. He moreover looked upon them as surface currents, by carefully following which a vessel might reach the pole; that they were, as his theory was called, "The Thermometric Gateways to the Pole." Lt. Weyprecht says, and he had ample means of ascertaining the fact, that the drift of the ice upon which the *Tegethof* was carried north, was in no way owing to the Gulf Stream; nor does he believe in the existence of an open polar sea, but says that there is no foundation for the conclusion that the ice on the south of Franz Joseph Land is impenetrable. Lt. Payer also has no belief in an open polar sea. He does not, however, think that north of Franz Joseph Land is accessible by ships. In his opinion, if they should succeed in getting past this ice barrier, the chance of their getting out again would be slight, and he regards the route by Smith's Sound as the best.

The Austrians are to send out another expedition next summer for the further exploration of Franz Joseph Land, under the same commanders, Lieutenants Weyprecht and Payer. It is to be divided into two parts. One under Lt. Payer, which is to proceed by the way of Behring's Straits, and the other, under Lt. Weyprecht, by the former route east of Greenland. The Germans have also determined to send an expedition in the same direction at a cost of \$300,000, to start, if possible, next June.

The English government has at last yielded to the requests of the Royal and the Geographical Societies to send out an expedition by the way of Smith's Sound, the route so long advocated by this Society, and which is now generally recognized as the one presenting the greatest advantages. The Admiralty have selected Rear Admirals McClintock, Sherard, Osborne and Richards to advise as to the fitting out of the expedition which is to leave next June, and is to be commanded by Captain Nares, the distinguished commander of the *Challenger*, and one of the vessels by Commander Markham. The expedition is to consist of two steam propellers, one of which is already purchased. There is to be a naturalist and geologist in each ship, and each officer, between the time of his appointment and the de-

pasture, is to take up some special branch of scientific investigation. The well-known Carl Petersen of Upernavik is to go as dog driver.

The results, geographical and scientific, of the voyage of the *Polaris* are not yet fully worked out, but, so far, have been enumerated as follows: The vessel reached $82^{\circ} 16' N.$, the highest latitude before attained by a vessel. The navigability of Kennedy's channel was proved. Seven hundred miles of coast line were discovered and surveyed. The probability was strengthened that Greenland is an island, having been separated from the continent in a north direction, and a very great number of scientific observations were made, embracing a large range of subjects, such as ocean physics, the force of gravity, astronomy, magnetism, meteorology, and natural history, which would alone justify the sending out of the expedition. The magnetic observations are said to be more complete than any other before made in the Arctic.

EUROPEAN RESEARCHES.

In Europe the governmental surveys heretofore commenced have been continued, and the long projected measurement of an arc of the meridian was begun last autumn. There have been several explorations of caves for the discovery of remains of prehistoric races. A skeleton was found at Mentone, of greater antiquity than the one in the museum of Paris; and in the Victoria cave in England, a human bone was found with the remains of elephants, rhinoceros, cave bears, hyenas and bisons, indicating the existence of man in England with these animals in the glacial period, and probably before it.

ARCHÆOLOGICAL DISCOVERIES.

That the remains of the ancient city unearthed by Dr. Schliemann is Troy, is still contested. Those who dispute it, however, are scholars who have never examined the locality, whilst, on the other hand, M. Emile Burnouf, one of the few scholars who are really authorities in such an inquiry, has, at Dr. Schliemann's request, examined his collection, and in an article in the *Revue des Deux Mondes*, evidently inclines to the opinion that it is really the ancient city of Priam that has been discovered. Mr. Gladstone, the late premier, also an authority, after comparing the discoveries with the poem, finds "an undeniable and close correspondence;" and Professor Keller of Friburg, a classical scholar of repute, who has examined both the collection and the locality, is unhesitating in his belief that the remains discovered are those of Troy, and gives his reasons in a letter to an American correspondent, extracts from which have been published in the

New York *Nation*. Dr. Schliemann, by an arrangement with the Turkish government, resumed his excavations last April. The value of his previous discoveries does not depend upon the question whether he has or has not discovered the site of ancient Troy, but, as has been truly remarked by the editor of the *Nation*, that, in the twenty thousand objects discovered by him, we have records which carry us back to the childhood of the world.

The recent excavations in Pompeii show that what has been revealed after the course of so many years, is after all but a small part of the city, and this is not only now indicated, but every extension adds new objects, and some of the deepest interest. A house was unearthed during the year, and upon the inner wall was a large painting of Orpheus, with the head bent listening to his music. Nothing connected with Pompeii has been of such interest as the discovery of its paintings. Of the architecture and sculpture of antiquity we were enabled to form an opinion from what has come down to us; but the paintings of Parrhaseus, Zeuxes, Appelles and other great masters had perished, and but for the discoveries in Pompeii we would have been unable to judge of the excellence to which the Greeks had arrived in the art of painting. The bringing to light, therefore, of this large picture of Orpheus after its long imprisonment of 1,800 years, is very interesting.

The excavations that are now going on in Rome are bringing to light numerous quantities of objects especially on the Esquiline, relating to nearly every thing connected with both the public and private life of the Romans. Ink-stands and bronze pens enough have been found to supply the notaries of the modern city. The coins are principally of bronze, but there is a large amount of gold and silver money. An Etruscan cemetery has been found on the Esquiline, and in the tomb of a priest the gold threads that were woven into his robe remained when every thing else had crumbled into dust. Eighty-two statues have been dug up, and amongst a great variety of tools, implements, and utensils, is the knife of the jockey of a circus, on the ivory handle of which is roughly cut the plan of the circus, his horse, his whip, and the palm he wore as a prize.

An ancient Egyptian medical treatise has been discovered by Professor Ebers, of Leipsic, which, by a calendar on the back of the papyrus, discloses that it was written 1600 years before Christ. It is a handbook of Egyptian medical science at that time, and a complete book from beginning to end; the historical and geographical interest of which is that the description of the drugs mentioned in it shows that at that period Egypt had extensive commercial relations with

Western Asia, and that there existed then an interchange of thought and knowledge. Recipes are given, borrowed from a celebrated physician in Phœnicia, and others derived from older medical works, which are referred to by name. It is to be translated, and will be the means of tracing the history of medical science from its early dawn.

ASIA.

In Asia, the geographical explorations and researches have, during the year, been numerous and widely distributed. The Sea of Aral has been surveyed by the Russians, and found to be 165 feet above the level of the ocean, and 250 feet above the Caspian. They have explored, in a steamer, the eastern branch of the river Oxus from its mouth in the Sea of Aral, for 200 miles, reaching the main branch of that river on the 5th of last August, and have also explored the former bed of the Oxus, finding that the old river flowed in two channels which are now dry, and that the country which those channels formerly drained, was the seat of an extensive civilization, of which nothing now remains but the ruins.

Mr. Forsyth's mission to Kashgar has been completed, and the treaty between the ruler of Kashgar and Great Britain was signed the 4th of last February. Colonel Gordon, a member of the party, crossed the unknown Pamir steppe at a height of 13,000 feet, and found a miserable country peopled by about 1,000 inhabitants, the winter climate of which is exceedingly severe.

Father Velinden, a Belgian missionary, has traversed the Ordos country in Mongolia, and has given a very interesting account of the people. A son of M. Lesseps has been employed in exploring the Himalaya mountains, with a view toward a railroad across Asia, and M. de la Porte has explored a part of Cambodia, and completed, with M. Moura, a map of the portion of Cambodia under the protectorate of the French. The river Hangkiang, in China, until hitherto almost unknown, is found by the Abbe David to be a river of great commercial importance, which is traversed by vessels of the largest class, and a British expedition has been organized, with the consent of the Chinese government, for the exploration of the province of Yunan, from the Burmese border. For the last four years, the rich and prosperous country around Tien-Tsin, in China, for an area of over 40,000 square kilometres, has been lying under water to a depth of nearly five feet — the result of inundations — and the unfortunate inhabitants of this once fertile portion of China have been driven away to create new homes in the waste country north of the

Chinese wall. Colonel O. Baker and Lieutenant W. E. Gill, R. E., have made a most interesting journey through northern Persia. They describe Kilat as one of the most remarkable places in the world, which might, they say, serve for Dr. Johnson's "Happy Valley" in the romance of Rasselas. It is entered by five gorges, each about three yards wide, the sides of which tower up perpendicularly like walls, so that this valley fastness is, if any thing can be, impregnable. The inhabitants live upon what is grown within, and therefore can never be starved out. The only drawback upon this otherwise exceptional spot is that it is not healthy, being too much confined.

The great surveys in India have been actively prosecuted during the year, and it is now computed that a survey of the whole of India will be accomplished within ten years. Sir George Campbell has been extensively among the native tribes, dwelling both in India and China, and has given an interesting account of the Kassia tribes between Siam and Birmah, where the doctrine of woman's rights is thoroughly carried out. The land is owned by the women. A woman lives in her own house, proposes to the husband, marries him, and if, at any time afterward, she is dissatisfied, exercises a free right of divorce; the consequence, however, of this is, that the women do the largest share of the work; the men, he says, feeling themselves to be the weaker vessels, and not responsible for the maintenance of the family, do comparatively nothing, and take life easy. Mr. J. Walhouse has visited a savage tribe on the western coast of India, called the Karagar, a remnant of a very ancient people, remarkable for their unswerving truthfulness. The practice prevails among them of wearing, over the usual garment, an apron made of green leaves, which is now, however, confined to the women. He thinks it is a badge of degradation, and the survival of a very ancient custom, a remark suggesting the passage in Genesis respecting Adam and Eve: "They sewed fig leaves together, and made themselves aprons."

General Cunningham, of the Archæological Survey, has explored the central provinces, and made discoveries of great importance among Buddhist remains at Bharahut, a place 120 miles south-west of Allahabad. It is the site of an ancient city, supposed to be one mentioned by Ptolemy, which, sixty years ago, was buried in dense jungle. In the midst of the jungle a building was found, surrounded by a stone railing or colonnade, nine feet high, profusely sculptured, with an inscription on nearly every stone. The age, as shown by the inscription, was two centuries and a half before Christ. The inscriptions are chiefly the records of donors of columns, like those we

see in the gift windows of our own churches. These sculptures are regarded by General Cunningham as the most valuable acquisition that has yet been made to our knowledge of ancient India. They record the dresses of all classes of the people at a period of three quarters of a century after the death of Alexander the Great; their houses, temples, personal ornaments, various kinds of animals, etc., and throw light upon the religion and customs of India at that early period. Some are humorous scenes, in which monkeys and elephants are the principal characters. One represents an elephant captured by monkeys, who have fastened a billet of wood along the length of his trunk so as to prevent his moving it. Ropes are fastened to his head and body, with which he is pulled along by the monkeys, who are dancing in a triumphant procession to cymbals played by other monkeys. The design, he says, is spirited, and very droll, though the execution is coarse. Our member, Mr. Frank Vincent, Jr., has published, during the year, an exceedingly interesting account of his journey in Siam, and of his visit to the remarkable ruins in Cambodia, to which I have so frequently referred.

The discovery in Bharahut and Cambodia of the stately ruins of former civilizations, overgrown by and buried in jungle, brings to mind the difficulties civilization has to struggle with in India from the rapid growth of vegetation, among which may be mentioned the advantages which this teeming vegetation affords for the harboring and increase of beasts of prey. During the last fifteen years, in the Presidency of Bombay alone, 13,400 human beings were killed by tigers, leopards, and other wild beasts.

Mr. V. Ball, of the Geological Survey of India, gives an extraordinary account of children found living with wolves in the north-western provinces of Oude. A boy was found in a wolf den by some Hindoos who were hunting. He had been burned out of the den, with the wolves. He was covered with scars and wounds, and was in his habits a wild animal in every respect, drinking like a dog, and preferring a bone and raw meat to any thing else. He would not remain with the other children, hiding away in dark corners, never wearing any clothes, but tearing them in shreds, and he died a few months after being taken. Another boy, fourteen years of age, was found among wolves, who learned to make sounds, but after six months had not learned to speak. Both boys were remarkable for the facility with which they moved about on their hands and feet. Before they would eat or taste their food they would smell it, and if the smell did not suit them, would throw it away.

PALESTINE.

Lieutenant Conder, R. E., has made important discoveries of ruins in the hill country of Judah, which he thinks he can identify with some of the lost Biblical cities. He has found boundary stones, which may prove to be the ancient Levitical landmarks. Mr. Henry Maudsley has also made recent discoveries upon Mount Zion. Lieutenant Conder says that the whole of Palestine will be surveyed within four years; that 300 square miles are now added to the map, being five times as much as was at first expected to be accomplished.

At the mouth of the Persian Gulf there is a small island of about twelve miles in circumference, called Ormus, or more properly Hormus. Though a barren rock, without vegetation or soil, it became, in the 16th century, from its geographical position, a place of great commercial importance and wealth, where the trade between Europe and the East was transacted. A town arose three miles in length along the coast, and two miles in width, and its merchants extended their commercial relations over Persia, Mesopotamia, and as far as the chief cities of Turkistan, Samarcand, Bokhara, and also to India. The Abbe Raynal describes Hormus as presenting a more splendid appearance than any city in the East, where persons from all parts of the world exchanged their commodities and transacted their business, and he says unusual opulence, an extensive commerce, the politeness of the men, and the attraction of the women, made it the seat of pleasure as well as trade. Milton refers to it in the well-known passage in "*Paradise Lost*," describing Satan in council:

High on a throne of royal state, which far
Outshone the wealth of Ormus and of Ind,
Satan exalted sat.

Last March, Lieutenant Stiffo, of the British Navy, visited Ormus, and found that even its building materials had been carried away, and that nothing remained of the once great and opulent city but a ruined minaret about seventy feet high, mounds strewn with broken pottery, and a vast number of water cisterns now choked with earth.

AFRICA.

Lieutenant Cameron, the commander of the Livingstone Relief expedition, after fulfilling the last duties of that trust, by transporting the remains of Dr. Livingstone to the coast, and securing the diaries and effects of the great explorer, devoted himself to the following up of Livingstone's explorations, and has made a most important geographical discovery, which fixes the farthest source of the

Nile within known limits, and which, there is every reason to think, will connect the network of lakes and rivers of the water system that Livingstone was investigating, with the great rivers that flow to the Western coast of Africa, and probably with the Congo.

Burton, one of the most accurate and reliable of investigators, when in 1858, he, with Speke, discovered Lake Tanganyika, ascertained, from native information, that a river flowed into this lake from the north, called the Rusizi, and another flowed from it, at its southern extremity, called the Marangu, which information, if correct, showed that Lake Tanganyika had no connection whatever with the Nile. This conclusion, however, was disputed, among others by Sir Samuel Baker, who, from information he had received, concluded that it was connected by a river with the Mwtan Nzige, or as Baker called it, the Albert Nyanza, and also by the late Dr. Beke, an eminent geographer and traveler, who maintained that the lake had no outlet. As respects the north of the lake, the correctness of Burton's information was corroborated by Livingstone and Stanley, who found the river Rusizi and ascertained that it and the other stream at the north flowed into Lake Tanganyika, so that there remained but the question, whether, farther down at the south, there was an outlet from which the waters flowed out of the lake, and this question Lieut. Cameron has settled. He devoted two months to the survey of the lake, during which he fixed the position astronomically of places, and ascertained the elevation of Lake Tanganyika to be 2,710 feet. He then proceeded in a boat along the eastern shore to the southern extremity of the lake, examining river after river, and found that they all flowed into it; upon which he continued his exploration up the western side, and, after carefully examining the shore for a distance of a little over one-third of the length of the lake, he found the outlet on the third of last May at a point twenty-five miles south of the Kasenge islands, which have been visited by both Speke and Livingstone. This outlet is a river called the Lukuga, flowing toward the west with a very slow current one or two knots an hour, such as is characteristic of the outlets of lakes where there is no great or sudden depression. He went into the river for a distance of four or five miles, when the further progress of the boat was stopped by floating grass and enormous rushes. He was informed, however, by the chief, who was very friendly, that this outlet flowed into the river Lualaba, which, it will be remembered, was the river that Livingstone was following up and was compelled to abandon and return to Ujiji, when Stanley found him. Lieut. Cameron also believed, from the native information

which he obtained, that the Lualaba is connected by a network of waters with the Congo, and resolved to ascertain the fact. He accordingly returned to Ujiji to make the necessary preparations, and, on the 23d of last May, he started directly across the Manyuema country to descend the Lualaba to its supposed connection with the Congo. It is to be regretted that he is but poorly provided with means, as the undertaking is one of great difficulty, and requires qualities of the highest kind, which, however, the brave young explorer has so far shown in a remarkable degree. If he should be successful, we may next hear of his returning through the Congo to the western coast; and, if he effects this, it will be one of the most important geographical achievements that has been accomplished in Africa, and place his name in the very front rank of African explorers. His account of the effect of the slave trade but intensifies that of Livingstone. In his journey around Lake Tanganyika, he was constantly shown places where there had been villages, the inhabitants of which had been carried off as slaves. He states that there is a great internal slave traffic; that it has depopulated large tracts, and that the wretched fugitives are now driven to sell each other as a means of subsistence.

We have received from Col. C. C. Long, chief of Gen. Gordon's staff, a most interesting account of his exploration of the Victoria Nyanza, and of the river found by Speke, which connects that lake with Lake Mwutan Nzige, discovered by Baker and called by him the Albert Nyanza. He explored the river in a boat from Urondogani, where Speke left it, and as he proceeded northward, entered a large lake or basin, twenty or twenty-five miles wide, where he was beset by storms, and after two days found his way out again into the river, and followed it far enough to verify that it is the stream that enters the Mwutan Nzige. He thought this lake or basin was not merely a reservoir of the Victoria Nyanza, but was supplied by a great watershed southward of it. It may possibly prove to be Lake Baringo, which is placed vaguely upon the maps upon native information. Col. Long is said to be the first white man who has been upon the Victoria Nyanza. It appeared to him to be from twelve to fifteen miles across, but he says it may be double that breadth. He found it to be from twenty-five to thirty feet in depth. He did not extend his exploration, however, very far, being attacked by a hostile chief in canoes, whom he succeeded in putting to flight after a very severe battle in which a large number of the savages were killed. With the details of his explorations he has sent us a very full account of the country, its products, people and rulers, which

will be published by the Society. Col. Long is an American and served with distinction in the United States army in the late war.

Dr. Nachtigall, to whose journey to Bornou I have previously referred, has returned after an exploration of five years, which has embraced the country east of the Caravan route from Murzuk to Kuka; that to the north and north-east of Lake Tsad; Bornou and then Wadai, Darfour and Kordofan, the region lying between Bornou and the Nile in upper Egypt. This long exploration of five years was prosecuted by Dr. Nachtigall with very limited means, in constant peril of his life and under great trials and hardships; at one time with his camels dead, his horse worn to a skeleton, and his sufferings aggravated by the preaching of a fanatic Missionary that the murder of a Christian was a passport to heaven; at another, traversing a district covered by malaria brought on by the overflow of Lake Tsad, which proved fatal alike to Arabs, Negroes, and to animals, the ravages among the latter of which during three years may be inferred from what he states, that one proprietor who had thirty-one thousand head of cattle lost all but three hundred. He visited Abeshir, the capital of Wadai, and was well received by Sultan Ali, who he pronounces the most sensible ruler in Central Africa. He found Wadai inferior to Bornou in natural wealth and civilization, and says that the curse of the countries he traversed is the internal slave trade. He saw a caravan of a thousand of these unhappy wretches chained, whilst they were driven to the distant market of Kuka, the drivers mercilessly cutting the throats of those who were even under the lash unable, from exhaustion, to continue their terrible march. Every friend of humanity will rejoice in the efforts of the Khedive of Egypt to suppress this traffic so far as it finds an outlet in his dominions. Colonel Gordon, under his direction, is now efficiently following up what was begun by Sir Samuel Baker. Darfour, the region north of the Lybian desert, is a great center and highway for this trade. The King of Darfour toward the close of the year, with an army of ten thousand men, invaded the Egyptian territory upon a slave-hunting expedition; the Egyptian governor, Zebia Bey, collected his forces, marched against the invader, defeated him in a battle which lasted six hours, and Darfour is now annexed to the Egyptian dominions.

The expedition of Rholf's for the exploration of the Lybian desert has returned. It was found to be the most sterile part of the Sahara, and that the permanent occupation of the Oasis is impossible. It is the dried-up basin of a shallow sea, below the level of the Mediterranean, the present surface of which was found to be a dry chalk plateau like the Swabian Alps.

The Rabbi Mardokhai Ben Abi Serour, a Jewish gentleman born in the Sahara, gave an account during the year, to the French Geographical Society, of various journeys made by him in Africa; among others a journey made to Timbuctoo, where he passed fourteen years, no Jew having before been admitted. A French expedition is now making preliminary investigations, as to the feasibility of M. Lesseps' project, for creating an inland sea to the south of Tunis. The project is warmly opposed by some who are familiar with this part of Africa, upon the ground that it is not only useless, but would have an injurious effect upon the climate of the south of Europe, and would also destroy the great source of wealth in this part of Africa, the cultivation of the date tree. Dr. Cassins says that the existing commerce can be sufficiently carried on by caravans, and that the commercial results of the undertaking would never justify the enormous expenditure, which is estimated at £24,000,000 sterling.

The explorations along the western coast of Africa have been unusually active. The Marquis de Compeigne and M. Marche have returned from their exploration of the river Ogowe in west equatorial Africa, which was not fully accomplished, as they were compelled, by war, and the receding waters, to return, but much was learned respecting the river, and the region which it drains. Dr. Güssfeldt made a journey up the Quilla river, and found a country reminding him of Switzerland. He returned to join an expedition which is to cross the Equator, and penetrate easterly to Monbutta country, explored by Dr. Schweinfurth. The Abbe Bouche has made a journey through part of Dahomey, and collected a mass of information respecting it, which he has laid before the French Geographical Society. Lient. Gandy, the commander of the West coast expedition for the relief of Dr. Livingstone, has returned, and laid before the Royal Geographical Society an interesting account of the region he traversed. He found the natives civilized but indolent, that roads were being made to intercept the transit of slaves to the coast, and that attention was given to the cultivation of the India rubber tree, of the value of which the natives were previously ignorant. A terrible epidemic, the small-pox, was decimating Congo as he passed through it, and he describes the Congo as one of the grandest rivers in the world, and as navigable for one hundred and ten miles from its mouth. On the east coast Mr. Stanley has organized an expedition from Zanzibar, which is to be prosecuted at the joint expense of the New York *Herald* and the London *Telegraph* — for the purpose of exploring the region last visited by Dr. Livingstone; and M. de Brazza is to explore in the same direction, the expense of which is

to be borne by the French Marine and the Geographical Society of Paris.

AUSTRALASIA.

The last general field of exploration has been among the great groups of islands in the middle and south Pacific, which we now embrace under the general term of Australasia. I shall begin with one of the northerly members of this great archipelago.

GEORGE PSALMANAZAR.

In the year 1702 a young man appeared in London, calling himself George Psalmanazar, a native of the island of Formosa converted to Christianity, who created the greatest interest by living exclusively upon raw meat, roots and herbs, and by the account he gave of Formosa, its people, government and history. The Bishop of London became his patron, many of the nobility and clergy interested themselves warmly about him, and as some persons doubted his story, he, to substantiate it, published a work in 1704, now a literary curiosity, in which he gave an elaborate account of the island, its geography, history, form of government, language, religion, and the manners and customs of its people, with an account also of his travels and conversion to Christianity, which was profusely illustrated with engravings of temples, altars for the worship of the sun and moon, portraits of the king, queen and viceroy, their palaces, figures of different classes of the people, the coins in use, the idols that were in the temples, the characters of the national alphabet, and a map of the island, the publication of which intensified the interest respecting him, so that the work rapidly passed to a second edition, but some statements in which ultimately led to the discovery that the whole was a fabrication, that he never could have been in Formosa, and that he was one of the most ingenious and successful of impostors.

Although he was but nineteen years of age, he had invented a language which he both wrote and spoke, and of the grammar of which he gave an account. He translated the catechism into this imaginary tongue, which performance was examined by the learned, who saw in it, or thought they did, a real language, having regular grammatical forms, and which they declared was wholly unknown. As has happened in other clever literary impostures, none are so unforgiving as those who have been thus deceived, and Psalmanazar, notwithstanding the extraordinary ability he displayed, sunk into obscurity for the remainder of his life in London, where he continued to live, eking out a bare subsistence by literary drudgery, and

where he died at the advanced age of eighty-three. This seclusion was in part self-sought, for no man was ever more sincerely repentant; no one regarded his past imposture with more disgust and abhorrence than he did himself, and he afterward became sincerely religious, humble-minded, and most exemplary in his life. Such is the testimony of Dr. Johnson, who knew him well, and frequently met him for the pleasure and instruction of conversing with him, and who, when asked by Mrs. Piozzi to tell her who was the best man he had ever known, immediately answered, George Psalmanazar. Shortly before his death he wrote an account of his early life, but concealed his real name, and the place of his birth, for the reason, as he said, that he belonged to an ancient but decayed family, which he did not wish to connect with his imposture. It has been conjectured that he was born in France, and probably in the province of Gascony. Of the island of Formosa he knew little more than the name, which was about as much as was then generally known respecting it in Europe, and the fabric he wove, beyond what was invention, was made up of such scraps of information about the far East as he had gathered from Jesuit missionaries, at whose seminary he was at school when a boy.

FORMOSA.

Notwithstanding the attention that was drawn to Formosa by this incident, very little until recently was known about the island, though it is only eighty miles from the eastern coast of China, except that the Dutch had established settlements and factories there as early as 1624; that the Chinese afterward colonized the western part, driving the natives gradually to the interior; and that the Dutch were expelled by the Chinese in 1664. Of the interior, especially of the eastern part, our information has been heretofore exceedingly scanty, and much that has recently been obtained is due to the Protestant and Roman Catholic missionaries, to General C. W. LeGendre, the United States Consul at Amoy and Formosa, and Prof. J. B. Steere, of the Michigan University, at Ann Arbor, who sent us last June an exceedingly interesting account of his explorations over the island, during a period of seven months, containing new and valuable information, accompanied by eight vocabularies of the language, as spoken by different tribes, written scores of the native music, photographs of the scenery and the Aborigines, a map of the island, made by Gen. LeGendre in 1870, and some old native manuscripts in the Roman character, dating as far back as 1723, sixty years after the expulsion of the Dutch.

Prof. Steere made large collections in natural history, for the University of Michigan, many of which are entirely new, and intended, during his stay, to study the native languages. He was unable during his journey to fix the position of places, having nothing with him but a pocket compass to indicate the direction, and for the distance between places, he had to rely upon native information and his own fatigue. The Aborigines, he says, are evidently allied to the Polynesian races, and he divides them into two great divisions: 1. The ancient inhabitants of the plains, who are scattered over the entire length of the island, and driven out by the Chinese from the cultivated part, and who are called by the Chinese *Pepo-hoans* (barbarians), and those in the center of the island, *Sik-hoans* (cultivated barbarians). 2. The wild and savage Aborigines who inhabit the steep, rocky mountains at the east, who occupy about half of the island, and although they consist of many tribes, are known by the general name of *Che-hoans* (unripe barbarians). The old manuscript referred to, he found among the *Pepo-hoans*, which being in our own letters, he thinks is owing to the former Dutch occupation, when the people, he supposes, were taught by the Dutch missionaries to write their own language in Roman characters, as has been done with our own Indians, and of which from the dates, the natives appear to have retained the knowledge for at least 150 years after the expulsion of the Dutch. The *Pepo-hoans* he found very poor, their lands being mortgaged to the Chinese. He describes them as honest, hospitable and kindly, differing from the Chinese in a natural love and taste for music. The children were bright and intelligent, and he noticed as a curious custom, that they are named after trees.

The second division, or the savages, the *Che-hoans*, are a small and inferior-looking race, averaging about five feet, but are very muscular from constant climbing in their steep mountains. He found that they were flat-footed, the arch of the foot being entirely wanting, the large toe turned toward the heel, and the feet as hard as horn, so that the sharp rocks do not penetrate them. Both men and women are tattooed. They are also a very musical people. Some little girls sang at his door all night. He saw a large number of men and women collected in the house of the chief, when the women sang a monotonous and musical chant, to which the men would reply. He says that the number of the savages it is difficult to estimate, but that they are more numerous than might be inferred from the rocky country they inhabit. Unlike mountain dwellers generally, they are not brave, and being badly armed, seek safety in the woods and rocks, through which they pass with the facility of wild animals.

Those who inhabit the sea-coast are a finer race, better armed, and plunder wrecked vessels. They cut off, dry and keep the heads of their enemies, for a trophy, as our Indian does with the scalp. Mr. S. saw twenty-four of these dried heads in one place, apparently belonging to one man. He found no evidence of their being cannibals, although they are reported to be so. They have no religious system, but are greatly troubled by superstitious fears in connection with natural sights and sounds. Among the *Kale-hoans*, one of the savage tribes, he found the women, whether at work in the fields or in the villages, had their heads always covered with wreaths of vines or flowers.

Although the Chinese are constantly encroaching upon the Aborigines, it would, he thinks, at the present rate, take centuries for them to gain possession of the mountainous parts, even if they could ever conquer the whole island. In the north end of the island, coal is found in great abundance. There is evidence there, of volcanic disturbances; sulphur is deposited in great quantities, and there are large, boiling mineral springs, and jets of steam issuing from the earth. The soil and climate of the island are particularly well adapted for the growth of the tea plant, the cultivation of which has been begun, and in one place has attained considerable importance. The island has long been resorted to for camphor, which may soon be exhausted, for the tree has to be destroyed to obtain the valuable drug, and it is not, he says, replanted.

Mr. E. S. Ravenstein, who has compiled, and recently published in the *Geographical Magazine*, a large body of facts respecting Formosa, thinks that the estimate of the population, three millions, is too large, and that it does not exceed a million and a half; but Prof. Steere gives three millions as the general estimate of the Chinese population alone, and, having had opportunities for personal observations, thinks even that to be an under estimate. Formosa, though only occupied by the Chinese for about two centuries, has seven walled cities. The wall of Taiwan-fu, the nominal capital, Prof. Steere says, is 25 feet in height as well as in breadth, and that it is said to be seven miles in circumference; the population within the wall he estimates at between thirty and sixty thousand. The Chinese population in Formosa, he says, are very turbulent, and that a revolution occurs about every ten years. Mr. S. also went over the Pescadore islands, a group lying between Formosa and China, but I have already exhausted my limits, by drafts from his very interesting paper.

NEW GUINEA.

I gave an extended account in my last address of the exploration and survey of H. M. S. Basilisk, commanded by Capt. Morsby, R. N., upon the east coast of New Guinea and the shores and islands in Torres Strait, and the very interesting description of the savage inhabitants of these hitherto unvisited regions. Their general character, their propensity to cannibalism, and their mode of life in houses erected upon poles. The Basilisk returned to England last autumn, after having been nearly four years in commission, during which twelve hundred miles of coast line was surveyed, and twelve first-class harbors, several navigable rivers, and more than one hundred islands, large and small, have been added to the charts. Some of the islands, unknown before the exploration of the Basilisk, are large and densely populated, exceedingly fertile, and intersected by navigable rivers. Some of the work done was performed in open boats detached from the ship, in some instances for many weeks, among savages who had never before seen the face of a white man. Two lofty mountains, about eleven thousand feet high, on the north-east coast of New Guinea, were named respectively Mount Gladstone and Mount Disraeli, the two rival peaks, very appropriately for the names they bear, being so placed as to face each other.

Dr. Beccarie, to whose previous explorations I have referred, when last heard from, had succeeded in reaching Makassar, which he intended to leave for Kendari, an unexplored region of the Celebes, and from whence he expects to proceed to New Guinea or Sumatra. He states that at Celebes, in the Moluccas and in the Aroe islands, there is a general belief in the existence of an enormous cuttle fish, which drags down boats with its giant arms and suckers, and which, in the Aroe islands, is known by the name of the Vareola. An expedition to the eastern coast of Sumatra is about to be dispatched by the Dutch Geographical Society.

AUSTRALASIA.

Col. P. F. Warburton has made a remarkable journey across Australia, from Adelaide to the west coast, which was achieved under extraordinary difficulties. After the first two hundred miles, the whole region traversed was a dreary, and scarcely habitable, waste, the country, with but few exceptional places, consisting of ridges of sand with intervening flats, which are without water and uninhabitable. The natives found are the very lowest in the scale of humanity. They had no huts nor place of shelter, except the

shady side of a bush. As to clothing, the men put a bone of the Walabee, a small animal that lives without water, through their noses, and are then, he says, in full dress; and as respects the dress of the women, he adds, there is nothing to say. The natives avoided the explorers, and were difficult to find. An attempt was made to catch and keep one without water, that he might thereby be compelled to point out where water was to be found. They succeeded in catching a girl, and to secure her, tied her fast to a tree, but she gnawed through the rope and escaped, running on tiptoe to prevent the explorers from discovering her trail.

Mr. John Forrest crossed Australia from the western coast through an unexplored country for two thousand miles along the 26th parallel of south latitude, in a journey of five months, much of the territory being of the poorest description.

The north-east exploration expedition from Queenstown, under Mr. D. C. Dalrymple, between $15^{\circ} 15''$ and $18^{\circ} 15''$ south latitude, ascended the range of the Belendin Kerr mountains, which are twenty-five miles in length, and were found to be of granite; new rivers were discovered and a country covered with jungle, the soil of which is suitable for the cultivation of sugar and other tropical products; this important newly-discovered land, being estimated at about half a million of acres.

In 1848 Ludwig Leichardt, a German traveler, went out at the head of an expedition for the exploration of Central Australia, and nothing more was heard of him or of his companions. In 1872, twenty-four years afterward, the government of Sydney sent out Andrew Hume to search for Leichardt. Last February, Hume returned with the information that he had found Clossen, Leichardt's fellow traveler, living among a tribe of bushmen, and that Clossen informed him that while he had gone off in pursuit of water, a mutiny broke out among Leichardt's followers, who stripped him of his tents, horses, and equipment, and set off in a north-westerly direction, leaving him to perish; that Leichardt died; and that the mutineers were eventually slain by the natives in attempting to reach the populated part of South Australia. Hume brought home Leichardt's quadrant, watch, and seventy pages of his notes; but Clossen, who had grown very weak and aged, refused to leave the bushmen.

A census of the Island of Ceylon has for the first time been taken, and found to be 2,500,000; and in the course of the year the Fejee islands, said to be 312 in number, and covering an area of 8,034 square miles, have been annexed to the kingdom of Great Britain.

After this review of the geographical work of the world in a single

year, I may, in conclusion, remark that although geographical inquiry began with the dawn of civilization, its progress has been necessarily slow; that although much is now known, much yet remains to be known, from which a conception may be formed of the vastness of the inquiry, of the obstacles which obstruct it, and of the infinite details it involves. The Creator, who has placed us upon this planet, has endowed us with faculties by which we can learn every thing respecting it, and the lesson taught by the past is, that, as that knowledge has increased, mankind has advanced in the scale of being. The same influences which have heretofore raised him from the savage state, which have converted the wilderness into a cultivated field, and brought about commercial intercourse, and the interchange of knowledge between people widely separated, still exist, and have yet a large field for their exercise in various parts of the globe. To the lonely traveler, and self-sacrificing missionary, it is a support and an encouragement to know that there are thirty-five geographical societies in the world, who watch their progress, estimate their labor at its value, and welcome each addition they make to the stock of human knowledge. The world is now fully awake to the importance of this work, and pervaded by the sentiment that there are no people too remote or too degraded to feel the influence and benefit by the results of geographical inquiry.

II.

PROCEEDINGS OF THE ARCTIC MEETING.*

At the Arctic Meeting of the Society held on the evening of February 16, 1874, in the large hall of the Cooper Institute, Chief-Justice DALY in the chair, more than 3,000 ladies and gentlemen were present, as many more going away, unable to obtain seats.

Extraordinary interest was manifested in the proceedings. Lieut.-Commander H. C. White, U. S. N., executive officer of the *Tigress*; Captains Buddington, Tyson and Chester; Mr. Bryan, the Astronomer of the *Polaris* Expedition, several survivors of the crew, and the Esquimaux Joe and Hannah had places on the platform; a large number of curiosities illustrative of Arctic life and scenery were exhibited and explained to the Fellows.

Chief-Justice DALY, on calling the meeting to order, said:

The meeting of this evening, ladies and gentlemen, has been especially appointed for the reception of the crew of the *Polaris*. (Applause.) The Society felt that it was due to them that it should

* NORDENSKIÖLD'S SLEDGE JOURNEY. — *Petermann's Mittheilungen* for December, 1873, contains an interesting account by Professor Nordenskiöld, of a sledge journey of between three and four hundred miles made by him in company with Lieutenant Palander, in May and June, 1873, from his winter quarters at Mussel bay to Phipp's island and thence back to Mussel bay by way of Cape Platen, through the island called North East Land from its situation in a north-easterly direction from the island of Spitzbergen. He reached Parry island on the 16th of May, and thence he crossed over to Phipp's island. Here he was compelled to abandon his last hope of pressing on toward the Pole upon sledges. He ascended an eminence and looked out toward the north, but looked in vain for the uninterrupted level plain or sheet of ice, which he had seen on two different occasions in previous years, stretching out over the sea, and which Parry and Scoresby had seen before him. To his surprise and disappointment, he beheld nothing but huge impassable masses of ice piled up loosely upon one another, and packed together so closely as to leave no gaps of open water or level strips of ice between them. Instead of returning to Mussel bay over the direct route by which he had come from there, he concluded to cross over to Cape Platen and make a journey through North East Land. In September, 1871, the English Arctic voyager, Mr.

not only as an individual body invite them to this reception, but that it should ask the public to come here to-night. (Applause.) The subject is of interest to the whole country, one which is acknowledged in other lands, and they are entitled to this mark of public acknowledgment for what has been accomplished in the expedition, and they are entitled to more sympathy from their extraordinary escape, at least the escape of a large portion of them. (Applause.) When you think of it, ladies and gentlemen, that nineteen persons in all, men, women, and children, floated upon a cake of ice, in darkness from the 15th of October until the 1st of May — 194 days — six months and a half — at one time reduced to a biscuit apiece and a small portion of pemmican; saved from the most horrible of all deaths, famine, by the accidental capture of a bear; when you think of them thus floating from the 80th to the 59th degree of north latitude, why, there is nothing like it in the whole history of maritime disaster. (Applause.) I do not propose, ladies and gentlemen, to say any thing in respect to Polar exploration, or the particular results of this expedition; a very distinguished member of the

Leigh Smith, in company with a Norwegian captain, named Ulve, had sailed eastwardly along the northern coast of this island, and made the discovery that it extended three degrees farther toward the east than previously supposed. From observations already made by them in the preceding August from high points near Cape Torrell and Thumb Point, they had discovered that the southern coast likewise extended much farther toward the east before turning to the north, than the maps represented. Their observations resulted in an addition to the dimensions of North East Land of, at least, one-half of its size as previously mapped. From Cape Platen, Professor Nordenskiöld made a journey of seven or eight days, eastwardly along the northern coast of North East Land, and confirmed the truth of the observations of Smith and Ulve, and mapped out the coast with its capes, and fiords, and islands, more accurately than they were able to do, as they did not venture upon the shore of the newly-discovered territory.

On the first of June Professor Nordenskiöld left the coast and traveled south-westwardly fourteen days, through storm and snow, over a vast continuous field of ice, two or three thousand feet thick, full of deceptive and dangerous clefts and fissures, toward Wahlenberg bay, which he finally reached in safety with his companions, after many startling adventures and hair-breadth escapes. He says that the principal direction of the glacial current in North East Land is toward the east, and that the eastern coast of the island consists, in most places, of a precipitous wall of ice, inaccessible from the sea, uninterrupted by tongues of land or mountain cliffs, and forming the broadest glacier or glacial stream that has yet been found — considerably broader than the Humboldt glacier, described by Kane, in West Greenland. The Swedish Professor, as is well known, is familiar with the glaciers of Greenland, and has found many instructive points between them and those just examined by him, and the scientific results of this expedition, when elaborated and published, as promised, will doubtless prove valuable in various ways, and especially in their bearing upon the different views and theories of glacial phenomena glacial action.

Society, Dr. Hayes, who has achieved his own laurels in the very region in which the *Polaris* proceeded, is here to-night, and I shall take the liberty to ask him to say in respect to that expedition that which would come more properly from him than me, he being at present one of the most distinguished of living Arctic explorers. (Applause.) We have also to-night our venerable ex-President, Mr. Grinnell, who at his own expense fitted out the first expedition in that region for the rescue of Sir John Franklin, and he afterward followed it up by the Kane expedition; and in this connection I may produce a relic. [Here was exhibited a small ensign, and continuing, he said]: This boat-flag, ladies and gentlemen, went on the first Antarctic expedition of Wilkes. It has been farther south on the globe and farther north than any other flag that ever floated. (Applause.) It went out on the first expedition sent by Mr. Grinnell and came back; it went again with Kane; it went again with Hayes; I delivered it, at Mr. Grinnell's request, into the hands of Hall, and it went with him. It is among the few relics that have been brought back, and Mr. Grinnell requests me to say he is ready to send it again if there is any American expedition fitted out for the discovery of the Pole, but not for any other purpose. We have also present to-night, ladies and gentlemen, one who is a member of the Society, who has been especially honored by the late Captain Hall by having his name forever inscribed upon the most extreme portion of the globe yet reached by man — Cape Brevoort — and I shall take occasion to call upon him to make a few remarks. Among the survivors of the *Polaris* we have Captain Buddington (applause) — and my old friends Joe and Hannah and their child. (Applause.) On the other side of the platform we have Captain Tyson (great applause) — who took care of this extraordinary party upon the cake of ice. [He then mentioned in turn all the rest of the party by name, and continuing, said]: There are two members of the party who are not here, who have written letters excusing themselves from attending on account of illness. One is Morton, who was Hayes' mate, and the other is Kruger. He writes me a brief letter, expressing his regret, that in consequence of illness, resulting from his long exposure upon the ice, he is unable to be present; but he says one thing in his letter, which I may take occasion to repeat. He says: "I wish you would thank Joe for our safety, for without him we would never have seen the United States." So I thank Joe accordingly. Now, ladies and gentlemen, it affords me great pleasure to introduce to you Dr. Hayes.

DR. HAYES on coming forward was greeted with applause.

DR. I. I. HAYES' ADDRESS.

MR. PRESIDENT AND FELLOWS OF THE AMERICAN GEOGRAPHICAL SOCIETY, LADIES AND GENTLEMEN:—I will not detain you long. There is here "metal more attractive." You have before you the officers and crew of the *Polaris*, whom you have been invited to meet, and to whom you would do honor. The Chief-Justice, as President of this Society, has invited me to speak a few words to you in relation to the general subject of Arctic geography, and with your permission I will invite your attention to the map behind me, which speaks for itself. It shows the Arctic world in circumpolar projection. On the one side we have the northern coasts of Europe and Asia; on the other side, North America; and in a broken line beyond, we have Greenland, Spitzbergen, and Nova Zembla. Against this land lies the great Arctic ice-belt or barrier which has thus far defied all the efforts of man to break completely through. Within it we have the "Open Polar Sea"—a myth to the ignorant, a wonder to the wise. It is interesting to inquire why this sea should ever have been even dreamed of. Once the north was thought to be bounded by the mountains of Hyperborea, from whose cavernous sides came the piercing north wind. Afterward we find those wonderful Phœnician merchants creeping along the shores of the Mediterranean, passing at length the Pillars of Hercules, which thus far had been thought to bound the world in the west, and braving the billows of the Atlantic, made their "Ultima Thule," or the world's end, at the Shetland islands, beyond which lies a region where "there is neither air, earth nor water." Then we see developing in succession the grand colonial system of Carthage; the Roman empire; Venice, the proud Queen of the Adriatic; and then the new maritime nation of Portugal, where, at the little town of Sagres, overlooking the sea, we find growing up, as the Chief-Justice in his last annual address has well observed, the first geographical society. Among the geographers there were De Gama, who reached India by doubling the southern capes of Africa; Columbus, who, conceiving the idea that the same thing could be done in another way, sailed to the westward and conducted his ships to a new world; and Magellan, who first ploughed with vessel's keel a track around the world. And now it was that Spain and Portugal became monarchs of the ocean. The Pope gave to the one all of America, and to the other all of Africa, and these two nations held firm possession of the South sea. "It is strange," said the King of France, "that the Lord should have forgotten us all in His will;" and forthwith France, England and Holland set about trying to reach the rich

countries of India and Cathay by the north. I will not detain you with any prolonged account of the various expeditions in that direction. It is enough for me to say that an enterprise, beginning soon after the discovery of America, was continued through more than three centuries, and was not brought to a close until the disastrous voyage of Sir John Franklin proved to the world that commerce had no chance by the Arctic seas. For, understand, the whole question of Arctic discovery, up to within a few years, has been a speculation of trade and not of science. We *now* want to know what nature has done in this northern world, but formerly it was what merchants could do there. To mercantile enterprise we are indebted for all original impulse toward Arctic discovery. The merchant has indeed always been the pioneer in geographical exploration. It is sometimes supposed that conquering armies have been the leaders in civilized progress, but it is not so. The merchant has invariably been the pioneer. It is the spirit of adventure, inspired by the spirit or desire of gain, that has throughout all time led men into untrodden fields. Men will go farther, and dare more in the pursuit of gain than in the chase of glory—more even than in support of their religion. The merchant is not one who merely buys and sells. In ancient times he commanded ships and fought battles; in later days he was the trusted counselor of kings; in our own age he is the master of empires. He was in Persia and India long before the conquering armies of Alexander the Great; he was in Tartary and China before the priest; it was a party of merchants traveling from the base of Mount Ararat to trade with the Roman merchants at Antioch, who, learning by the way that a king of the Jews had been born in Bethlehem of Judea, turned aside from their course to do him homage, and to make him a rich present of spices and of myrrh. But this is wandering from the subject. Let us come once more to the map. Franklin failed, and his party, as you all know, were lost, after three winters' imprisonment in "the thick-ribbed ice," without accomplishing a north-west passage. That passage was made, however, by McClure, in 1853, but it only resulted in showing that no route by the Arctic waters could be found and made practicable. And now, commerce abandoning her place, science claims the great unknown waste about the North Pole as her own, and the civilized nations of the globe are each seeking in her service to plant the emblem of its nationality at the northern axis of the earth. With the history of the search for Franklin you are all familiar. You recall the names of McClintock, of McClure, of Collinson, of Richardson, of Rae, of Bellot, of Meacham, of Ingle-

field, of Osborne, of our own gallant *De Haven*, and among a long list of others honored equally, that of the late Captain Hall, who traveled overland from Repulse bay. You will also recall the memorable expedition of Dr. Kane, which, fitted out by the munificent liberality of Mr. Grinnell, sought the Polar water, upon the theory that Franklin had attempted the route by Smith's sound. I need not tell you that he was on the wrong track; but he did reach "the open sea," or at least he reached open water, and seemed to confirm the theory of an open sea to the northward, which theory had long been sustained by scientists. It was in this same direction that I conducted my expedition in 1860, for the organization of which I was so much indebted to this Society. And it was upon this same track that the late Captain Hall, and these brave men whom you have before you here to-night, strove in the *Polaris* to break the final bonds which link the known with the unknown, and first open with man-made keel of ship a route across the mysterious Polar sea. Regarding the voyage of the *Polaris*, I have no occasion to speak in detail. You will soon have an opportunity of hearing from those who were there. My duty is simply to point out their course and situation. The *Polaris* penetrated Smith's sound without meeting such embarrassing obstacles as those which beset Inglefield, Kane, and myself. No ice seems indeed to have been met with, until that long distance had been traversed, which Kane and I were only able to accomplish over the frozen sea in the spring with sledges — none, indeed, until they had probably attained a higher latitude than had before been reached by any ship. This will forever make the expedition famous. Over the same track which occupied me sixty days with dog sledges, Captain Hall sailed in three days, unobstructed by ice. His was a most fortunate season. The reports say that he was in latitude $82^{\circ} 16'$ north — about twenty or twenty-five miles, perhaps, nearer the North Pole in open water than I reached with dog teams over the ice. In that same quarter in the month of May, 1861, I saw open water extending as far as the eye could survey to the northward. It was the same water which Kane saw a month later in the season of 1854, from the opposite side of Kennedy channel. Now, we are all anxious to know why the *Polaris* did not go farther. She was there at the most open part of the season (the 30th of August), and we have not yet received any full details regarding the condition of ice and water which then and there prevailed, and which prevented their further progress north. I have a very great interest in this matter, as I have on all possible occasions before this Society, and elsewhere, advocated the route to

the North Pole by way of Smith's sound. I have always been in favor of building up a colony at the mouth of Smith's sound, at my old winter harbor of Port Foulke, to and from which a sailing vessel could sail annually in communication with home, while a small steamer would work northward, and that plan announced to this Society more than fifteen years ago is not only corroborated, but is strengthened by the results of the *Polaris* expedition, so far as I understand them, and in this general view I believe I am sustained by Captain Markham, R. N., and many others, learned and experienced in Arctic exploration. I believe I am also supported in my opinion by Mr. Clements Markham, the accomplished Secretary of the Royal Geographical Society of London, in the advocacy of this my present theory. But, I came here to-night hoping to be enlightened, and I hope Captains Buddington, Tyson, and Chester, and such others as will kindly favor us, will clear up the question as to whether Smith's sound, and thence through Kennedy channel and Robeson's straits, is or is not available. Of the untimely death of Captain Hall we have been only too well assured. We cannot now interrogate personally that bold-hearted man. He did not live to bring his own record. Many of his papers appear to have been lost. The object which he had so resolutely at heart was not accomplished, and we are here to-night to learn what we can concerning the causes of the failure to reach the North Pole, as well as to honor those who took part in the great struggle. Having presented, as best I could in words, a general outline of the Arctic world, I will now exhibit to your view, features of that mystical region in as real manner as possible, by other means. A few photographic views will now be exhibited. Most of them were taken by Mr. John Dunmore, during the several expeditions of Mr. William Bradford, the eminent artist, who has done so much to make the public familiar with the beauties of the Arctic regions by means of his magic brush; the others were taken by myself in my voyage of 1860, and all of these have been made available for our use to-night by the accomplished photographic artist, Mr. J. W. Black, of Boston, who has no superior in his peculiar line, and who has generously contributed to the evening's entertainment by voluntarily coming from Boston to exhibit the pictures.

The President then called upon Mr. R. W. D. BRYAN, the astronomer who accompanied the *Polaris* party. He said:

My impression is, that under the circumstances in which the *Polaris* was at the highest northern latitude, no vessel was ever built, or if built, was ever manned, that could have penetrated the ice to the north of the vessel. There was heavy ice about the vessel, large,

massive floes, miles in extent, varying in thickness from ten to twenty feet. Through these large and massive floes, were leads of open water, and through these leads the vessel had been pushed as far north as it was possible to push any vessel. The ice that was met there at that time, in the fall of the year, was met the next spring and at the beginning of next summer. In Newman's bay, twenty miles north of the winter quarters of the *Polaris*, or thereabouts, two boats' crews remained for over one month, waiting for an opportunity to launch their boats and go northward. Their united evidence is, that during all that time, heavy masses of ice continued to move down the channel, rendering it utterly impossible for them to proceed any farther north. The vessel itself, upon three different occasions, left its winter quarters, and attempted to penetrate farther north, and each time it was met by this same barrier of ice. I would then give it as my firm conviction, that no vessel has ever been built, that could, under the same circumstances, have gone farther north, than did the noble *Hall* take the brave little *Polaris*.

Remarks were also made by Captains Buddington, Tyson and Chester, but they prefer to give their written statements, as follows :

GROTON, *February 20, 1874.*

To the American Geographical Society :

As there has been a great deal said about the voyage of the *Polaris*, I consider it my duty to make a straightforward statement. Not wishing to build myself up by tearing some one else down (as is too often the case), every statement I make here, I will prove by the majority and best of the officers and crew. And I wish to state here, I never sailed with better officers and crew, during twenty-one years, as master of a ship; I refer to the mate, second mate, engineers, seamen, firemen, cook and steward. After leaving Upernavik we passed Melville bay, Smith's sound and Kennedy channel with little or no obstruction from ice. After passing through Kennedy channel we went into what we called Hall's basin; we passed through that and came into a channel which Captain Hall named Robeson's channel; proceeded up to lat. $82^{\circ} 16'$, where we met with heavy ice, all old, heavy floes. Captain Hall designated them century floes. This strait was running true N. N. E.; we had a hundred and four degrees westerly variation, at 4 o'clock A. M., August 29th, 1871. We came to a full stop at this barrier making from one shore to the other; these straits were about fifteen miles wide. The weather being cloudy, could get no observation; the ice in the middle of the straits was setting south, about two miles an

hour. As there was no chance of getting farther north, Captain Hall told me to go on the east side of the straits and look for a harbor. When within about a mile of the shore, we found the tide running very strong to the southward, the heavy floes going along the shore at the rate of about four miles an hour. Captain Hall and Captain Tyson endeavored to land twice, but owing to the strong tide and heavy ice, found it impossible to do so. As it was impossible to proceed farther north, Captain Hall held a consultation with the officers and scientific gentlemen; the result I will give you in their own words: Dr. Bessels was the first consulted; his opinion was, if we could get no farther north, to cross the straits and winter on the west side, as the east side was better for navigation; the west was better for sledge journeys. Mr. Myers was then consulted, and coincided with Dr. Bessels; Mr. Morton's opinion was the same, or nearly so; Captain Tyson's, to get into a harbor as soon as possible; Mr. Chester's, to get as far north as possible, as every mile we got north with the ship would save so much sledging. I was then asked my opinion; I said it was best to go into Newman's bay, which was five or six miles south of us, and hold on until there was an opening for us to the north, as the ice was setting south, and we were losing ground every minute; but Captain Hall decided to try and cross the straits to the west, if possible—if not, to return into Newman's bay. In trying to cross the straits, we got beset among the heavy floes, and drifted fifty miles to the south. We got one very heavy nip, and landed a part of our provisions and stores on the ice. The ice slacked up, and we finally got clear the afternoon of September 4th, and worked in shore on the east side of Hall's basin, where we came to anchor between the shore and a large grounded berg in what is now called Polaris bay, in ten fathoms of water. The next day, Captain Hall went on top of a mountain to take a look at Robeson's channel; when he came back he told me to land the provisions and prepare for winter, as he had decided it would be impossible to proceed farther that year. On the 10th of October, he made a sledge journey to Newman's bay; Robeson's channel was still blocked with ice, moving south, which I think was convincing proof that there was no water near us to the north. If there had been, we being anchored, the ice would have passed us, and we should have soon been in open water. As long as we had light, the ice was moving south in the channel, and as soon as we had light in the spring, it was still moving the same. On the 24th of October, in the afternoon, Captain Hall returned to the ship from his sledge journey to Newman's bay, and spoke very highly of it as a winter harbor, and

wished we had been there ; he was taken sick the same afternoon, and died on the 8th of November, and was buried on the 10th. Every man (especially seamen) knows what it is to lose a commander on the beginning of a long voyage ; the subordinate who is so unfortunate as to try to fill his position has a great many obstacles to surmount, especially where so many are on an equality, as on board the *Polaris*. It matters but little what his qualifications may be, he cannot command and demand the respect that the commander has who sails in command from home. I found it impossible to keep up the same discipline, or the same kind of discipline that Captain Hall had ; the duty of the ship was strictly attended to ; the amusement of the men was somewhat different. They took a great interest in hunting and dog driving, and as I knew that pleasure, combined with exercise, was the only thing for health in that country, I indulged them in that luxury. I think it was owing to this we had not a sick man during the winter. A sailor with a gun or a horse is a very busy, but not a profitable man. In the spring of 1872, I used every means in my power with ship, boats and sledges, to proceed north, but failed in every attempt, and finally, on the 12th of August, with the ship leaking badly, and our coal nearly exhausted, I made up my mind to return home. As to the accusations concerning Captain Hall's death, deserting the party on the ice intentionally, or habitual drunkenness, I think them too ridiculous to mention ; as I consider a person who would be guilty of such things, would surely deny them.

Very respectfully yours,

J. O. BUDDINGTON.

To Hon. CHARLES P. DALY, President of the American Geographical Society :

SIR :—In compliance with your request that I should give you my views upon the hydrography of Smith's sound, and the waters connecting with it to the northward—and especially as to the correctness of some of the views advanced before the Geographical Society, on the occasion of its late "Reception to the officers and crew of the late *Polaris* Expedition," I here briefly set down my ideas upon the subject. On the occasion referred to, Captain Buddington gave it as his opinion "that it was impossible to get through Robeson's channel," adding that he "saw no signs of water to the northward." Now, Captain Buddington has seen ice before, but on this occasion, seemed to have taken counsel of his fears, rather than a correct

observation of the facts in the case. Then followed Mr. Bryan, the Astronomer and Chaplain to the expedition, who was just seven days old in the Arctic world when called into counsel by Captain Hall; and with all due respect to our young scientific friend, who thinks that "the ship was never built, or if built, never manned, that could penetrate the ice" north of $82^{\circ} 16'$, it must be remembered that he was not appointed on the expedition as a Polar expert, but to take observations on the stars, and if possible, to reach beyond, to the heavenly gates, in his *role* of chaplain; but even he did not say but that a dark water cloud could be distinctly seen, and apparently close to us, at our highest latitude north. But first, to settle the question as to the ice-pack in Smith's sound. Captain Buddington declared that he "could see no water there," and was for turning back and putting into Port Foulke. The pack-ice on the 28th of August, 1871, was very heavy and compact, but there was water close under the west shore, and during my watch on deck, I rounded or flanked that pack, by sailing first to the S. S. W., and made the west shore at 2 o'clock A. M., rounding the western edge of the pack at 4 o'clock A. M., I then went below — the *Polaris* had then been steaming directly up the land for two hours. At 6:30 A. M., Captain Buddington sent the *Stewart* (Heron) to call me; I went on deck; Captain Hall was then about half way to the shore in one of the boats — the vessel being abreast of Cape Frazer, and about half a mile from the shore. On coming on deck, I asked Captain Buddington what Captain Hall was going on shore for. He replied, "to look for a harbor; we cannot get any farther north, there is no water ahead;" but upon my plainly showing him his error, he said, "Well, we must not go any farther, we have got too far now; if we go any farther north, we will never get back." Now, if we had turned back at this point, Messrs. Buddington and Bryan would undoubtedly have said, that the *Polaris* had gone as far as it was possible to go, and that "the ship was never built, or if built, never manned," that could have penetrated the ice of Smith's sound! Captain Hall soon returned, very fortunately finding no harbor, and the vessel was again pointed northward, steaming through close and heavy flocs off of and to the north of Cape Frazer — coming, in a few hours, to comparatively clear water; and for one hundred and fifty miles there was scarcely any ice to be seen, nor indeed until we came to Robeson's channel. The snow had at that time entirely disappeared from the land, nor was there any shore-ice adhering to the coast — indeed, all that was needed to give the scenery the aspect of the temperate zone, was a few trees. But here was a new channel — new at least to the

knowledge of the civilized world — blocked with large, heavy floes. Robeson's channel is about eighteen or twenty miles wide, and I think from thirty to thirty-five miles through. Here we found the ice very close and heavy; it was also very much discolored with earth and mixed with stones, which showed that these floes had been formed on the plateaux farther north, and had drifted down to their present position during the summer, and had thus blocked up the channel. This obstruction, however, was merely temporary — all that was needed was a strong blow from the N. or N. E. to clear the blockade, by driving this ice to the southward, thus leaving the channel navigable. Captain Hall, finding it impossible just then to get the vessel through on the east side, called a consultation of officers. There were present Captains Buddington, Chester, Morton, Dr. Bessels, Myers, and myself. Buddington wished to return south to the bay, since known as Newman's, and there spend the winter. I told Captain Hall that he should try and find a safe harbor at once for the vessel, where he could, without risking the *Polaris*, lie by and watch for the movement of the ice in Robeson's channel, and where he might be able to take advantage of an opening; for I felt convinced that the first strong wind would clear the channel and give us the opportunity to get farther north. But the majority were in favor of trying the west shore, wishing to see if the vessel could not be forced through on that side. So to the westward the *Polaris* steamed; and in a few hours we were among the large heavy floes — and yet, all this time there was the dark water cloud but a short distance to the north of us. Occasionally a damp, black fog would roll down upon the vessel, with the light N. E. wind which then prevailed. I also saw here a great deal of ice, which looked as if it had been washed by the sea; the vessel's head, too, rose and fell with the swell, as we approached Robeson's channel. But here we were, locked in among the floes, with water both to the north and south — Kane's "open Polar sea" to the south, and the unknown world and waters to the north, with but a few miles of ice lying between the *Polaris*, and the unsolved mysteries beyond. Soon the N. E. wind, which had been very moderate, increased to a gale, and as I had anticipated, the ice in Robeson's channel commenced moving southward at about two miles an hour, and away we went with it, until the ice reached the opening of *Polaris* bay, when it broke and spread, and the vessel was free once more. Now then the vessel could have steamed through the channel — now was the time; delay was ruin, for the season was then drawing to its close; but winter was approaching, a few days remained yet in which we might have

navigated those seas, and with steam have accomplished — we know not how much more. But instead of improving this opportunity, which Providence fairly thrust in our faces, we steamed for a little bay south of Cape Lupton, since called Thank God Harbor. There we found good anchorage in eleven fathoms of water, having a mud bottom. We had, however, at this anchorage no other protection than such as the grounded hummocks afforded, and that was very little. It was about 3 o'clock A. M., on the 1st or 2d of September, when we made this harbor. About 8 o'clock A. M., Captain Hall held another consultation with Chester and myself, Captain Buddington standing by. As there was plenty of water, our decision was to go northward again, but this decision was overruled — the sailing-master, Captain Buddington, declaring that "she should not move from there." It would have taken the *Polaris* but a few hours to have steamed entirely through Robeson's channel, supposing the ice to have been cleared out, as I have no doubt it was at that time. A few days after anchoring we had our first snowstorm; the snow falling amid the hummocks, lay for some days soft and plush-like, but gradually hardened so that we could walk upon it. But for many days, indeed, until we lost the light, there was plenty of water within a few hundred yards of the vessel. In the latter part of November, in a very heavy N. E. gale, our little *Polaris* broke out of her winter quarters. We had no daylight then, so we could not see how much water surrounded us, but the vessel was in considerable motion, rising and falling several feet to the swell. North-east winds prevailed during the winter, often blowing with great violence; the gales continuing sometimes for five or six consecutive days. These N. E. gales would drive the ice all southward — then new ice would again form, only to be driven away by the next gale. In February, although the sun's disc had not appeared above the horizon, yet our light was quite good. At midday you could see as well as though the sun had been shining; and after one of those fierce N. E. gales, I climbed to the top of Cape Lupton (about eighteen hundred feet), and from that elevation I could see no ice; the gales had driven it all southward. To the north the horizon looked dark and watery. Even the ice along the shores had disappeared — none remained, except the ice grounded among the shoals running from Cape Lupton to the Southern Fiord. In March, the ice became permanent; the N. E. gales had no effect on it any more, until the month of May, when it was once more in motion, drifting first south, then north, crushing and grinding itself into its original ele-

ment—water. There is great significance in the tides to those who can understand them. In strong southerly gales the tides were invariably higher than at any other time, and while the gale continued in this direction there would be but a very slight fall, while during the prevalence of N. E. gales the tides did not rise near so high; and in the long heavy gales from the north, very low tides were observed and very little rise. Mr. Bryan, as confirming his hypothesis of the impossibility of getting farther northward, said that “in the spring they made several attempts to get north with the vessel” (while I was up at Newman’s bay). This proves nothing, even if the attempts made had been genuine efforts, for the only proper time to navigate these waters is the latter part of August. On the 30th of August, 1871, there was an opportunity to get north through Robeson’s channel. In June, 1872, Buddington made some feints to get north, but he had said plainly to me before that he did not wish to go any farther north, and these purposeless endeavors were meant simply to impress the inexperienced on board that he had done his whole duty. In fact, the *Polaris* had been so badly handled through the winter, that she was not in condition to continue her voyage with any prospect of success—providing the provision and coal had been sufficient, which they were not, on account of the great waste which had been permitted through the winter, after Captain Hall’s death. In regard to the expedition of the two boats which started for the northward in June, 1872, they were too frail—only half-inch cedar planking to contend with Arctic ice. The month of June, too, is one of the worst seasons for boat journeying in the far north, for then the broken ice is most plentiful—then, the Arctic seas, fiords and bays are breaking up, and emptying themselves into the straits and channels; wind and current helping to force these floes and hummocks to the south. The attempts, therefore, to get the *Polaris* northward at that time were simply folly—exploiting for the purpose above named. Of the two boat parties all the men lived to return, but of the boats, neither. One was lost almost as soon as launched, and the two others had to be abandoned twenty miles from the ship, the officers and crews walking back over land. You will ask: Why did not an exploring expedition go by land? Those who were willing to go could not get the authority or proper means to go with. There were excellent opportunities to accomplish something by land travel. We had plenty of good dogs, and two good Esquimaux drivers—one of them (Joe) even wanted to go, but beyond thirty-one miles north of where the ship lay, nothing was known—that distance Mr. Myers and myself traveled on a musk-ox

hunt, up to latitude $82^{\circ} 9'$ North; beyond that the foot of white man has never trodden. Respectfully yours,

GEORGE E. TYSON,

Late Assistant Navigator to Polaris Expedition.

NOANK, *February 20, 1874.*

CHIEF-JUSTICE DALY:

SIR:—To comply with your wish, I write you a short and truthful narrative of the progress of the *Polaris*, of the late North Pole Expedition, after leaving Tessuisak, the most northern settlement on Greenland. Leaving Tessuisak on the afternoon of the 23d of August, 1871, a dense fog prevailing, we steamed along to the north about half speed, feeling our way through the fog, passing occasionally near large icebergs. We were enveloped in a dense fog till meridian of the 24th. I mention this to show that there were twenty-four hours' steaming, a little better than half speed. On the clearing up of the fog, thousands of icebergs were in sight; looking to the north, from our vessel, the icebergs were so numerous that they presented an impenetrable wall of ice, no opening to be seen through them; but as we advanced up, we wormed the *Polaris* through between them till we came out to the north. At about 7 o'clock in the afternoon of the 24th we came up to pack-ice, but it was so open that we had no difficulty in steaming through it. A few hours' steaming cleared us of this ice, and we came out into a clear, open sea of water beyond. Cape York was now in sight, and we were making the best of our way toward it. There was no ice to be seen to the north at this time. On the morning of the 25th, we came up to pack-ice near Cape York, and were obliged to steam off to the west a number of miles, where the pack loosened, we again steaming to the north. At about 6 o'clock in the afternoon of this day, we passed through between Wolstenholme and Saunders island; we continued to encounter loose drifting ice up to about 10 o'clock on the morning of the 26th, when we were in clear water again. Not a speck of ice to be seen to the north, with the exception of two or three small icebergs. We passed up through Smith's straits, no pack-ice to be seen. About 5 o'clock on the afternoon of the 26th, we passed Littleton island, the island near which, fourteen months later, the *Polaris* was lost. When nearly abreast of Cairn Point, the course was shaped for Cape Frazer, on the west side of Smith's sound. After entering Smith's sound, small patches of ice were

seen here and there. At about midnight we came up to the pack, and were obliged to steer off some to the west, where the pack was looser; to the east and north the pack was heavy and close, to the west it was more open and navigable. We had no difficulty in steaming along, for the next morning, at 7 o'clock, Captain Hall landed with the boat at Cape Frazer. His object was to examine a small bay to see if it was suitable for a winter harbor, should we be compelled to retreat south again by meeting with heavy ice. He soon returned to the ship, and we commenced steaming again to the north, passing through loose drifting ice till we reached Cape Wilkes. We there emerged into a sea of open water again, no ice to be seen to the north, of any description, either bergs or pack-ice. We steamed along, keeping near the west coast. In the evening a thick fog shut down, which obscured the land on both sides of the channel. We steamed along slowly, meeting no ice. At midnight passed near a small island. Its peculiar shape attracted our attention, it being, on its southern side, a perpendicular bluff out of the sea to an elevation of about three hundred feet, and then sloping down gradually to the sea on its northern side. We passed near this island in coming south with the *Polaris* about a year later, and recognized it as being the one passed in the fog going up. There were also two other islands near this, in Kennedy channel, one large and one small one; the three extended nearly one-half of the distance across the channel. The channel here was about eighteen miles in width. To resume my story: on the morning of the 28th, the fog clearing up, a beautiful sight met our gaze; the sun shone out bright; the land to the north, east and west entirely clear of snow, even in the deep ravines, where, in a much lower latitude, the snow remains the year round, was here almost entirely clear, and the land looked so pleasant and warm that we were anxious to make a landing upon it. On the clearing up of the fog this morning, we found ourselves near the mouth of what is now known as the Southern Fiord, at *Polaris* bay. Several altitudes of the sun were taken here by different observers. It remained clear about one hour. From our position at this time, looking toward the north, no channel or outlet could be seen in that direction; the Grinnell land connecting with the Greenland side, some began to think we were in a bay. The fog soon shutting down, we were compelled to lay still here till noon, small patches of ice about. We attempted to make a sounding here, running out two hundred and seventy-five fathoms of line, finding no bottom. At noon the fog cleared away again, sun out. Meridian altitudes of the sun

were taken; then commenced to steam to the north again. Advancing up toward what is now known as Cape Lupton, we began to open a channel out to the north, which is now known as Robeson's channel. Early in the afternoon thick snow set in. Steaming slowly through loose, drifting ice, the snow compelled us to make fast to the ice occasionally, when it was too thick, and we would steam ahead again when the snow cleared a little. We noticed quite a strong current here setting down the channel to the south-west. The most of the ice here was loose, drifting ice, and no difficulty in steaming through it. Clear weather was all we wanted here. The channel, as near as we could judge, at this time, looking up through it, was about sixteen or seventeen miles in width. We were bothered, more or less, with thick snow till the night of the 30th of August. When we were steaming up the channel through loose, drifting ice on the morning of the 31st, passed what is now known as Newman's bay. Several miles to the north of this, Captain Hall tried to effect a landing, but the small ice near the shore moving so rapidly with the current prevented him, and he was compelled to return to the vessel. Soon after his arrival on board, in steaming up through loose, drift ice, the vessel was stopped and turned round, heading down the channel; the officers were called up, and a consultation held. The result of this consultation was a decision to cross the channel and try to work up the west shore. In crossing this channel we were beset, near the middle, and began to drift south with the ice. It was my firm conviction at the time, and has been ever since, that if we had pushed ahead, keeping near the east shore, where we were, in a few hours we could have been out through Robeson's channel into a large bay or sea beyond. While we were in Robeson's channel, a dark cloud was constantly seen to the north, having the appearance of a water cloud; this same dark cloud was seen by myself and Captain Hall, forty-eight days later, from the summit of Cape Brevoort, the North cape of Newman's bay. I sincerely believe that that cloud hung over a sea or space of open water. I cannot place any blame on Captain Hall for the ship not being pushed ahead. At the time she was first stopped in Robeson's channel he was unacquainted with ice navigation in a vessel, and therefore was obliged to listen to some one else. I had great confidence in the man before we left the United States, and that confidence was the same up to the day of his death. I am satisfied in my own mind, had his life been spared, the expedition would have been a complete success. There have been many conflicting stories told about the appearance and condition of the ice in

Robeson's channel. I have written to you here just as I saw it, and have given you my opinion about it, and I am confident, in my own mind, that had the *Polaris* been pushed on at the time we were working up the east shore, a very high latitude might have been reached. After getting beset in the ice in Robeson's channel, we drifted slowly to the south-west down the channel, against a south and south-west wind, till the 3d of September, when the ice opening by a north-east wind, we began to steam in toward the east shore of the channel. In steaming in, myself being at the mast-head, I saw a lane of open water about two or three miles in width, extending as far as I could see to the north, up the east shore of Robeson's channel; the ice had been driven off by this fresh breeze that was now blowing from the north-east, and had cleared the east shore of the channel of ice, and I have no doubt but what, at that time, we could have steamed up through Robeson's channel without hitting a piece of ice; but we continued steaming in toward *Polaris* bay, and at midnight, though it was pretty light at that time, we were in close to the shore with the vessel, and I accompanied Captain Hall on shore, who landed, unfurled the Stars and Stripes, and took possession of the land in the name of the President of the United States. The vessel was soon brought to an anchor, and the next morning the landing of stores, coal and provisions commenced. Here our vessel lay till the 12th of August, 1872, a grounded iceberg forming our harbor. On the 21st of September the first musk-ox was captured; on the 10th of October following, Captain Hall started on his sledge journey to the north, returned on the 24th, and died on the 8th of November. The ice was broken up in our winter harbor on the 21st of November, and the ship driven against an iceberg. Two days after, the new ice getting sufficiently thick, we sawed the vessel out about eighty feet clear of the iceberg. On the 28th of November, during a heavy gale from the south-west, the pressure of the pack drove the iceberg in on to the vessel, a tongue of the iceberg running under the vessel raised her up and listed her over some. The next day, after the gale abated, it would have been an easy job to have sawed the *Polaris* out clear of this iceberg again; had we done so, the *Polaris* would have been sound the next spring, and the living aboard of her during the winter would have been much pleasanter for all of us. I will not tire your patience any longer. There are some little items during this portion of the voyage up that I have omitted, which probably I ought to have put down, but I have given you a truthful outline

sketch of it, as far as I am able to do. Hoping that this short narrative will prove satisfactory to your wish, I subscribe myself,

Your most obedient and humble servant,

H. C. CHESTER,

Late Chief Mate U. S. Steamer Polaris, North Pole Expedition.

NEW YORK, *March 12, 1874.*

CHARLES P. DALY,

President American Geographical Society.

DEAR SIR:—In compliance with your request I will give you a statement of what I know respecting the voyage of the *Polaris*, and my opinion, as you request it, in relation to the result. I went with DeHaven in search of Sir John Franklin, in 1850; again with Dr. Kane, in 1853, in which voyage we took the route through Smith's sound, so that I had the benefit of previous Arctic experience in these two expeditions, and my opinion will be founded upon this previous experience and what I saw while on board the *Polaris*. My position on board the *Polaris* was that of second mate, and I suppose my opportunities for observation were as favorable as those of any of the officers or men. When the further course of the vessel was checked at $82^{\circ} 16'$ north latitude, there was a heavy pack of ice in the mid-channel which obstructed her further progress, but to the east there was an opening between the pack and the shore and a water sky ahead in that direction to the north-east, indicating very plainly the existence of open water in that direction. There was no indication of land north or north-east. Those who supposed they saw it, saw, in my judgment, a fog bank, which, to inexperienced eyes, is frequently confounded with land. There was an opening also to the west of the pack, but no water sky there, and the land in that direction tended a little to the east of north. The pack which checked our course was setting south at the rate of a mile an hour at the very least, with a strong tide boiling up through any opening it found in the pack. We were nearer the east than the west shore, and Captain Hall, thinking he saw a harbor, went with a boat and landed on the east side, but after examining it twice and finding no harbor, he called a consultation of the officers, consisting of Captains Buddington, Tyson, Chester, Dr. Bessels and myself. Buddington was of the opinion that it was impracticable to get farther north, and was for returning south for a harbor at Newman's bay. Tyson was for seeking "a harbor immediately." These were his very

words. Chester was for pushing farther north, under any circumstances, either to the east or the west. Dr. Bessels was for going to the west, and getting north as far as practicable, his opinion being that as there was open water there, we would find smooth ice and better traveling for sledges, and be nearer the north, and I coincided with Dr. Bessels, at least to the extent of getting farther north. I wished to hold on to what we had if possible, as every inch was then important, and to take advantage of a harbor if we found one. Hall decided in favor of Dr. Bessels, and the attempt was made to get to the west, but in the effort we were inextricably caught in the pack and were carried by it so far south that we could not get into Newman's bay. In my opinion, from the appearances at the north-east the vessel might have got farther north. I think if we had not been delayed when we were first obstructed by the pack we might have got to the northward by the east or the west shore some distance, of course one cannot say how far. I have known Dr. Kane to have surmounted greater difficulties than we then encountered. We lost nearly half a day before the attempt was made to get to the north and, in the meanwhile, were rapidly drifting south. Captain Tyson speaks of another consultation in which he recommended another attempt to get north, but I know of no such consultation, and I learn from Captain Buddington and Mr. Chester that no such consultation was held. I never heard of Captain Tyson recommending any attempt to get farther north. At the consultation, and from all I have heard him say, he was always in favor of going into a winter harbor, although from the 1st to the 10th of September is the most favorable time for getting north, when there is open water, and there was open water during that time, and in fact more or less during the winter, while we were in Polaris bay. There is a very strong current setting to the southward through Robeson's channel. The heavy masses of ice drifting down Robeson's channel could not, in my opinion, get through Kennedy channel, there being three islands abreast of Cape Constitution, and it is my opinion that a large portion of this ice passed out through Lady Franklin bay to the westward. It does not get out through the South Fiord, eastwardly, as that is blocked up apparently, by icebergs. Dr. Bessels and Mr. Bryan attempted to penetrate in that direction, but were unsuccessful. I think there is an undercurrent setting through that Fiord from the eastward, but it is merely an impression. There was no sledge traveling during the winter or spring of any importance. Had Captain Hall lived, an earnest attempt would have been made with sledges to get farther north, for we were well provided, having sixty dogs, two

Esquimaux hunters, and every facility for sledge traveling; but we passed the winter and the spring feeding the dogs upon pemmican, consuming a large amount of provisions without making any attempt with sledges. This branch was entirely under the separate control of Dr. Bessels. Why did he not make the attempt I do not know. Captain Buddington and the other officers, so far as I know, were willing to give him every facility. So far as any value is to be attached to my opinion from my previous Arctic experience, I think the attempt should have been made. Dr. Bessels may have had good reasons for not making it, but I am not acquainted with them. After the snow melted and sledging was impossible, Captain Buddington fitted out boat parties, but they accomplished nothing. They lost three boats advancing only eighteen miles, and had to return overland on foot. While the boat parties were away, we sawed the vessel out from her winter quarters, and got out into the open water of the channel, with the intention of following up our boat parties to the north. We then made three attempts to get north, but were driven back by the pack-ice. We were short of fuel, and had to work the ship under canvas, but she did not carry enough sail to make headway against a headwind and current. In addition to this, all the seamen, except Captain Buddington and myself, were away with the boats, and we had not force enough to make sail. She was a good sea boat, and as fine a one as I have ever been in. The only fault I could find was, that for Arctic exploration, the construction of her bows, which were too upright, prevented her from lifting easily when obstructed by ice, the pressure of ice against her wedging her in, and she did not lift easily over it, as the Scotch whalers do. I wish to mention one important fact as contrasted with my previous experience — that is, the greater abundance of animal life as we got farther north. When I was with Dr. Kane wintering in Rensselaër harbor, we found no musk-oxen, and during two winters only killed two deer. In the early spring we made three hunting expeditions from Polaris bay, and found a great deal of animal life and musk-oxen in abundance. On each occasion we went no farther than twelve miles east, and killed twenty-six musk-oxen. Had we desired we could have killed a great number and laid up beef enough to last for a season. In addition, there were large quantities of brent geese, eider-duck, ptarmigan, doveking, besides hares and plenty of seals. The fowl were flying in the spring to the north, whence they return to the south in the autumn. The eider-duck and the brent geese hatched their young on islands to escape from the foxes which destroy their eggs and young, from which I infer, as we saw large quantities

of these birds going north every spring, that there must be islands farther north and open water. I know that these birds raise their young on islands, because I have constantly observed it during my former expeditions with De Haven and Kane. We also saw in our journeys into the interior, high grass in the valleys, where the musk-oxen feed, in latitude nearly 82° and I suppose beyond it.* In answer to one of your inquiries, my impression is, from what I saw, that Greenland does not extend to the Pole, but is surrounded on the north by water, but this is only an opinion founded upon the lay of the land as it trends to the eastward. I have made three Arctic voyages in this direction, and as I am now fifty-seven years old, I shall not probably make another. If I were to express the result of my experience, it is a firm conviction that the Pole can be reached by this route. I know of no difficulties that would make it impossible. I think it can be accomplished by two vessels properly equipped and manned, and conducted by a competent and resolute leader. Captain Hall was a determined and persevering commander, and had he lived he would, in my opinion, have got much farther north, if, indeed, he would not have reached the Pole itself. The result of my third voyage is that I am more than ever convinced of the practicability and possibility of reaching the Pole, and I firmly believe it will yet be done.

Respectfully and truly yours,

WILLIAM MORTON.

Mr. WILLIAM BRADFORD exhibited, by means of the Stereopticon, a series of photographic views taken by himself and Dr. Hayes within the Arctic circle, dwelling at length on the customs of the Esquimaux. Mr. J. Carson Brevoort then offered the following resolution, which was seconded by Dr. Hayes and unanimously adopted:

Whereas, A precedent has been established by the English, German and other governments by which it is recognized as an act of justice that the survivors of Polar expeditions and other dangerous exploring enterprises should receive extra pay for their services; and

Whereas, The officers and crew of the *Polaris* expedition have suffered more than any other explorers of modern times while afford-

* Around *Polaris* bay there was an abundance of flowers of various kinds and of all colors. The willow grew to a large size, sorrel and grasses were plenty. The willows farther south are dwarfed, seldom rising more than two or three inches above the ground, while around *Polaris* bay they were three feet high and formed large bushes. I took no observations, but it is my impression, that the temperature was milder in *Polaris* bay than it was in Rensselaer harbor, farther south, during the two winters that I passed there.

ing, by their labors, important contributions to geographical knowledge; therefore

Resolved, That the American Geographical Society is convinced that the survivors of the *Polaris* are entitled to a generous compensation in addition to the regular rates allowed them by the Government in view of the perils and hardships they underwent during the extraordinary cruise of that vessel within the Arctic circle, and that the Society will use all proper influence with the Government to accomplish that object.

III.

OASIS OF KHIVA.

Over two thousand Fellows and Guests of the Society gathered in the large hall of the Cooper Institute to hear Mr. J. A. MacGahan narrate the incidents of his remarkable journey to Khiva. Chief-Justice DALY, in calling the meeting to order, said :

The paper of to-night will be by Mr. J. A. MacGahan, who, as the card states, is the only civilian who was present with the Russian column at the capture of Khiva. Mr. MacGahan and the Society are honored to-night with the presence of General Sherman—(cheers)—who has come from Washington for the purpose of being present on this occasion. (Cheers.) As General Sherman is himself a traveler, and has passed over a portion of Asia, I shall, if I may take the liberty, in the course of the evening, ask him to say a word or two in regard to his journey in the Caucasus. I make that request for a particular reason, because I think he will gratify the audience if he will afterward exhibit the views of the Caucasus given by Mr. Kennan in his account of that interesting country. Mr. Black, who was here on the occasion of the Polaris reception, photographing the views, has come from Boston to-night to render us the same service on this occasion. It is now, I think, about five hundred years ago since Marco Polo made that most remarkable journey from Venice to Cathay, the account of which was received with so much astonishment in Europe, and woke that country up from its lethargy to undertake an enterprise to go to the Cape of Good Hope and discover the country. During that journey Marco Polo passed twelve months in that country, traversed by the gentleman who will speak to-night, and from that time to the present, under the intolerance of Mohammedan rule, it has been shut out from the civilized world. The country traversed by the gentleman who will speak to-night was, during the visit of Marco Polo, a part of the great empire established by Ghengis Khan, and is now the present home of the Turcomans. It was also Mr. MacGahan's good fortune to be a spectator of those

military movements which have resulted in opening up that country to the knowledge of mankind, and which have extended the power of Russia from the shores of the Caspian to the northern bank of the Oxus. He is to speak of an old land to-night, but new to modern civilization. It affords me great pleasure to introduce to you Mr. MacGahan. (Cheers.)

Mr. MACGAHAN said :

MR. PRESIDENT, FELLOWS OF THE AMERICAN GEOGRAPHICAL SOCIETY, LADIES AND GENTLEMEN :— Before proceeding with my paper this evening, I would say that I recognize in the distinguished assemblage gathered here a soldier whose fame I found had preceded the Russian arms in Khiva. Little did I dream, one hot tropical day in June, when the Russian army arrived within sight of the Oxus, with parched tongues and empty stomachs after a desert march of seven hundred miles, as Kaufmann and myself, seated in contiguous saddles, were discussing Sherman's march from Atlanta to the sea, that I would ever find the great American soldier an auditor of mine, during my recital of the Khiva campaign. I need not say, ladies and gentlemen, how gratified I am to see him here, although I am perfectly aware that in his case, at least, I am carrying coals to Newcastle. The subject of the paper I am about to read is Khiva. It is a country about which so little is known by the general public, that to give any thing like a full and complete account of it, together with a history of the Russian campaign which resulted in its conquest, in the short time allotted to me, will be a very difficult task. There are many among my audience to-night, I fear, who would find it hard to tell where Khiva is, and I am fain to confess that when the proprietor of the New York *Herald* first proposed to me to go there I had to look at a map to assure myself that I had even an approximate idea of its position in the mysterious regions of Central Asia. Few Europeans have visited it, and these, owing to the suspicious character of its people and the blood-thirsty dispositions of its rulers, have labored under such great disadvantages in obtaining information that they have returned with very vague and unsatisfactory accounts. Many of them never returned to tell the story of their adventures, but suffered the most terrible deaths at the hands of the merciless and blood-thirsty khans. Little, therefore, has been known about it, and that little vague and unreliable. An oasis, in the middle of the wide and almost impassable deserts of the Turcomans and the Kyzil Koom, surrounded on all sides by an ocean of sand hundreds of miles in extent, it has remained as unknown and mysterious as some distant, undiscovered island in the South seas, or the wild and lonely regions around the

North Pole—an eyesore and a source of constant irritation to members of learned bodies like that at whose invitation I am here to-night. The difficulties, therefore, of giving, in the short space of an hour, any thing like a comprehensive and detailed account of a place so little known are very great, and I hope my listeners will show every indulgence to the almost inevitable shortcomings in such an attempt. I will endeavor to give the greatest possible information in the fewest possible words. First, then, as to the position of Khiva. It lies on the left bank of the Amoo Daria or Oxus of ancient history, twenty miles from the river and one hundred and fifty from where the stream empties into the Aral sea, about four hundred miles east from the Caspian, and twenty-six hundred from St. Petersburg. It is in latitude 41° , about that of New York. It is surrounded on all sides by what has been considered hitherto an impassable desert for an army. From the shores of the Caspian on the west, almost to the Hindoo Koosh mountains on the east,—a distance of one hundred miles,—from the frontiers of Afghanistan and Persia on the south to the broad, level steppes of Siberia on the north, nine hundred miles distant, it is a level expanse of plain, alternating between sand and gravel, in which only the hardest of plants and grapes can find nourishment and life, and only relieved here and there by a low chain of barren, sandy, slaty mountains. The greater part of it, and especially that portion lying east and south of the Aral sea, is three hundred feet below the level of the ocean, and the whole of it is supposed to have formed, at some time in the history of the earth, the bed of an immense, shallow, inland sea, of which only the Caspian and the Aral now remain. In the middle of this desert is the oasis of Khiva. It has a length of about two hundred miles, with an average width of seventy-five, and contains a population of nearly one million souls. The inhabitants are Uzluks, Sarts, Karakulpaks, Kirghese, Kipchaks, Kalmucks and Turcomans, together with about forty thousand Persians, who, before the Russian campaign, were slaves. Although there is a wide field for ethnological speculation and research among the peoples of Central Asia, and although little is positively known of their origin and connection with each other, it may be broadly stated that they all belong to that branch of the Mongolian race known as Tartars, approaching and receding from the original Mongolian type as they have become more or less mixed with neighboring peoples of the Caucasian race—the descendants of those same Tartars who twice swept over Europe like an avalanche, almost annihilating every trace of Western civilization. Their principal vocation is tilling the soil, varied, however, by predatory

excursions on their neighbors of Bokhara and Russia, and the plundering of caravans passing through the desert.

These marauding excursions were carried on while mounted on their fleet-footed horses. With great skill they would sally out from their fastnesses in the heart of the desert, and would fall upon an unprotected caravan and plunder it without the slightest regard for the rights of property; or they attacked Russians or Cossacks who would inadvertently stray too far from their posts, and carry their captives off to Khiva as slaves, and snap their fingers at Russian projects of revenge, trusting to their isolation and the impassable barrier of sand which surrounded them for impunity. And this brings me to the causes which led to the Russian campaign against them; these were amply good and sufficient, as will be seen.

First.—The liberation of Russian subjects held there as slaves.

Second.—The desire to punish an untold number of outrages of the kind spoken of, perpetrated through a long series of years.

Third.—To force the Khan to make a commercial treaty which would allow the Russians to trade at Khiva, and throw it open to Russian merchants with the same privileges accorded to native merchants. Gen. Kaufmann had long been trying to persuade the Khan to make a treaty allowing the Russians to visit Khiva for the purposes of trade; but the latter had always replied that trading between different nations could best be done on the frontier between the two countries; and the frontier between his dominions and Russia was the Sir, the Khan claiming the whole desert between that river and the Oxus. This little fiction kept the Russians at the comfortable distance of about five hundred miles from the real frontier of Khiva, which result the Khan probably regarded as a master-stroke of diplomacy.

The *fourth* and last reason was, to strike a death blow at Mohammedanism in the Orient, the only bond of union between the many different peoples of Central Asia. Since the Russian victory over Bokhara—the Rome of Islamism—and its reduction to a state of dependence on Russia, Khiva has been considered the great stronghold of the faith. It was considered impregnable. The Moollahs of their religion averred and prophesied that it never would be taken; their poets sung that it never could be taken; their warriors swore by the beard of the Prophet that it never should be taken. For three hundred years the Russians had been trying to conquer it. Four different expeditions had been sent against it, all of which had ended disastrously; and the little oasis in the heart of the desert still refused to bow to the might of the “Great White Tsar,” and

remained proudly defiant, the last hope of the followers of the Prophet. It was necessary that the hopes founded on a belief in the impregnability of Khiva, and its invisible protection by the Prophet, should cease, and this was not one of the least of the reasons which induced the Russians to undertake the campaign. The history of the previous campaigns undertaken against Khiva is very curious, and deserves notice. Having left the greater part of my notes and papers in Europe, I can give neither names nor dates, and must therefore confine myself to a short account of the principal facts connected with them. The first occurred, I think, about three hundred years ago, and was undertaken by an officer of the Cossacks (I cannot remember his name), who entered upon it with a few hundred followers, upon his own account, without authority from the Tsar or anybody else. It was, in short, a kind of freebooting expedition on a large scale. He actually succeeded in conquering the place, the Khan barely escaping with his life, and leaving his treasures and harem in the hands of the conqueror. The latter remained in Khiva several months, and governed the place. Having fallen in love with the Khan's favorite wife, he induced her to become a Christian, and married her. In the meantime the Khan, having fled to Bokhara, obtained aid from the Emir, assembled an army, and marched on Khiva. The Russians learning this, and not feeling strong enough to hold the place, retreated. They were pursued by the Khan, bent upon avenging his honor, and were overtaken on the banks of the Sir. A battle ensued, in which the Russians were completely cut to pieces. Their daring leader and his newly-converted wife were killed in the fight, and scarcely more than a dozen of his followers escaped to tell the story. Fifty years later, another expedition succeeded in entering Khiva. The Khan surrendered at discretion, and affected to become reconciled to the Russian domination. When he had succeeded in winning their confidence, and deceiving them as to his real intentions, he persuaded the Russian general to distribute his troops throughout the Khanate in small bodies, under pretext of supplying them the more readily with provisions; then, upon a preconcerted signal, the whole population rose as one man and killed the Russians in detail. Not a single one escaped, and their fate is only known by the reports of the Khivans themselves. Peter the Great sent a third expedition against Khiva, which, starting from the Eastern shores of the Caspian, attempted to follow up the ancient bed of the Oxus. This likewise ended disastrously, the larger portion of the expeditionary forces, either from the terrible cold, or the fleet-footed cavalry of the Turcomans, perished: Then followed the

expedition of General Perovsky in 1840, which leaving Orenburg in the depth of winter, without adequate protection against the terrible cold of the steppes, was so reduced by death and disease as to be obliged to return before having reached more than half way to Khiva. Since then the Russians have made rapid strides in the conquest of Central Asia. Taught by bitter experience, they have moved forward slowly but surely, never advancing a step without thoroughly exploring the ground before them, and never risking the chances of a defeat. Slowly they have extended their chain of forts reaching from Orenburg to Samarcand, of which the links are Orsk, Kara-Bootak, Irghese, Fort No. 1, or Kazalinsk on the Sir, Fort No 2, Fort Perovsky, Toorkestan, Chemkend, Taskkend, Djizak and Samarcand, slowly encircling the doomed Oasis Khiva. Every year for the last few years, scouting parties were sent out from Kazalinsk, Perovsky and Taskkend, across the desert, between the Oxus and the Sir, to explore the country, and some of these parties almost reached the Oxus, and obtained reliable and exact information regarding the number of wells; quantity of water they would supply; the best routes for an army; possibilities of transporting artillery, and other necessary information for the projected campaign, so that when General Kaufmann started on his march, it was with a full knowledge of the difficulties to be overcome, and the best means of overcoming them. Long before even the Emperor's permission was obtained, provisions were laid in, clothes made, an abundant supply of munitions of war provided, and every thing was in readiness, so that when General Kaufmann returned to Toorkistan, after obtaining the approval of the Tsar, he had only to give the order to march. The troops of this column had already been assembled at Djizak, and they left that point on the 12th of March, in extremely cold weather. They consisted of fourteen companies of infantry, about two thousand one hundred men, one thousand Cossacks, ten pieces of artillery; eight six pounders and two nine pounders, a calibre unknown I believe outside of the Russian army. Another column left Kazalinsk about the same time, under command of the Grand Duke Nicholas Constantine, consisting of one thousand infantry, seven hundred Cossacks, two pieces of six, and two mitrailleuses. This force it was expected would unite with that of Kaufmann in the Bookan mountains, but owing to the fact of General Kaufmann's having changed his route after starting, they only formed their junction at Jamdi, a hundred miles farther to the east. The transport for the army was supplied by camels, and the train consisted of about four thousand. They were supplied by the Kirghese of the Kysil Koom, at the rate

of eight dollars per month for each camel, Kaufmann agreeing to pay thirty-five dollars for every camel that died. The result was that the Kirghese brought in all their old diseased and worthless beasts, which, dying on the march, left the troops almost without transport in the middle of the desert, very nearly causing a terrible disaster. In addition to these forces, three other columns started for Khiva at nearly the same time. One under General Mutkosof, consisting of about five thousand men, left the valley of the Atrek on the southern shores of the Caspian, and crossing the Toorkman desert, reached within one hundred and twenty-five miles of Khiva, and was then obliged to turn back for want of water, the expedition proving almost as disastrous a failure as that of Perovsky in 1840. The column from Orenburg consisted of three thousand five hundred men, infantry and cavalry. Leaving the forts on the Emba river in the depth of winter, when the snow was many feet deep, their march is one of the most remarkable on record, as well for the hardships endured from the intense cold, as for the distance marched — more than one thousand miles. Their course lay in a south-easterly direction until they reached the western coast of the Aral sea, when they marched down its shores, turned it on the south, and struck the Oxus at Koongrad, where they were joined by the fifth column from Kinderlie, on the north-east shore of the Caspian. This column was composed of seventeen hundred infantry, and three hundred Cossacks, and they were almost entirely unprovided with transport. After suffering the most incredible hardships, and almost perishing of thirst and heat, they at last rejoined the Orenburg detachment in safety in the Oasis. It is not the least remarkable circumstance of this extraordinary campaign, that these four columns starting from as many different points of the compass, hundreds of miles apart, after marches varying from sixty to ninety days, should nevertheless reach Khiva within one day of each other; and it shows how admirably the whole campaign was organized. Military men, scanning the plan of the campaign, will probably wish to know why the Fort No. 1 was not used exclusively as the base of operations, with the steamers plying on the Sir and the Aral as a means of transporting the troops to some point on the southern shore of the latter sea, near the mouth of the Oxus, from which point about four days' march would have brought them to the well-tilled gardens of the Oasis, where they might have found supplies in abundance. I believe it is not clearly demonstrated that this would not have been the better plan for the campaign. The reasons given by the Russians are, that the navigation of the Aral sea with the flat-bottomed boats constructed

for the Sir, is not safe in the spring and early part of the summer, and that to wait until mid-summer would be likewise dangerous, on account of the uncertainty of the duration of the campaign; besides which, there might have been considerable difficulty in effecting a landing on its shallow shores, in face of superior numbers. The difficulties, however, appear far less to a superficial observer, than those attendant upon a sixty days' march across the desert. It would be impossible, in the time allotted to the reading of such a paper as this, to give any detailed account of the extraordinary march of these four columns. Suffice it to say, that the difficulties surmounted, and the hardships suffered by the Russian soldiers, without a murmur, were such as I think no other soldiers in the world are capable of enduring. Kaufmann reached the Oxus on the 25th of May, after having been seventy-four days en route. He then marched down the right bank fifty miles, to Sheik Arik, where he dislodged the Khivans from a fort on the opposite bank, and commenced crossing on the 30th, in boats he had captured from the Khivans. Now let us glance briefly at home life in Central Asia. The houses and farm-yards are inclosed with heavy walls, from fifteen to twenty feet high, strengthened with pillars placed at regular intervals, and strong corner towers, and are entered by an arched and covered gateway, closing with a very heavy wooden gate. They are all built on the same rectangular plan, from twenty-five to seventy-five yards square, each farm-house being a little fortress in itself, far more formidable than the one at Sheik Arik, and are actually built to serve that purpose against the Turcomans, who, nearly every year, make raids on their Usbeg neighbors. The walls are composed of mud, but of a certain kind that gets comparatively hard, and it is not worked up into small bricks, as in Mexico, but into huge blocks like granite, three or four feet square, and as many thick. Inside of this rectangle, which contains the stables for horses, cattle, sheep, and in fact, all their live stock, as well as the dwelling of the inhabitants, is always a little pool of clean water, thirty or forty feet square, and shaded by three or four large elms. The elms of Khiva are very beautiful. I saw many of a size and beauty that would make the heart of the "Autocrat of the Breakfast Table" joyful, and which were probably many hundred years old, so that the farms containing them can boast of as great antiquity as many a feudal castle of Europe. Under these trees, during the summer, the family pass a great deal of their time, preparing and eating their meals, passing their hours of idleness, of which there are a good many in the life of an Usbeg, while the women weave

and spin the golden threads of the silk worm. The interior of their houses is dark, gloomy and uncomfortable, only lighted by small holes in the walls, window glass being unknown, but very often fitted up with a quantity of carpets, bright-colored mats, rugs and cushions. We rode into the first farm-house we came to—the gate was standing wide open—and found three or four men sitting quietly under the elms beside the little pool. They were a little startled at first, but came forward with their hats off, bowing very humbly. The Colonel told them what we were after, to which they replied, “that they were in a very difficult position; that if they sold supplies to the Russians, the Khan would cut off their heads; and if they did not, the Russians would pillage them.” The Colonel told them to take whatever they had to sell, to the camp, and that, as the Russians were immediately going to occupy the country, he would see that they were protected. They promised to obey, and we advanced to the next house, where the same scene was repeated. On the afternoon of the 9th of June, we reached a point about ten miles from Khiva, and encamped near a little lake. All the way along the road, the people had come to meet us in groups of twenty and thirty, offering their submission and presenting bread, apricots, and sometimes a lamb, or sheep, or a calf, as a peace offering. Toward evening, a cousin of the Khan arrived with a letter from him, stating that the detachment from Orenburg had that day attacked the town, and had been repulsed; that they were now bombarding it, and praying that the bombardment might cease, as he was ready to surrender upon any terms Kaufmann might dictate. Said Emir Ool-Oomar, the envoy, was about seventy years old, very feeble and with an idiotic expression of face, caused by a hanging lower jaw and open mouth, said to be the result of opium eating. He was not so imbecile as he looked however, and had proved the soundness of his judgment by advising the Khan for years to accede to the demands of the Russians and thus prevent an invasion, for which advice he had been long in disgrace. He was now charged by the latter to intercede in his favor. He was dressed in a bright green khalat, a tall black sheepskin hat, large boots made of unblackened leather, pointed and turned up at the toes, and with high narrow heels. Kaufmann turned off the road under some trees to hear the story of the Orenburg detachment, which was very interesting. During this time I was very much astonished to hear several reports of cannon, which was rather extraordinary, considering that the city had already surrendered. I did not receive the explanation of this circumstance for several days

afterward. After a halt of about two hours, during which time negotiations were carried on with old Said Emir Ool-Oomar for the surrender of the city, General Golovachoff moved forward with two companies of infantry, leading the head of the column, followed by four pieces of artillery; after these two more companies and two hundred Cossacks. It was now about noon, and in twenty minutes we were within sight of the renowned city. We did not see it until we were within less than half a mile, owing to the masses of trees everywhere that completely hid it from our view. At last it broke upon us from the clouds of dust which we had raised, and which prevented us from catching more than occasional glimpses until we were under the very walls. Great heavy mud walls they were, high and battlemented, with heavy round buttresses and a ditch, partly dry, partly filled with water, over which we could see the tops of trees, a few tall minarets, domes of mosques, and one immense round tower that reflected the rays of the sun like porcelain. We were before the gate of Hazar-Asp, a heavy arched and covered gateway, ten feet wide by twenty deep, arched over with brick and flanked by heavy towers with loop-holes, a little fortress in itself. Through this gate which had been opened to receive us, in a cloud of dust so dense and thick that I at times could not see my horse's head, we marched with flying colors, a military band from the Orenburg detachment playing the Russian national air. As we passed through the long arched gateway we left the dust behind us, and emerging from this, found the city before us.

I think every one of us experienced a feeling of disappointment. We had not expected much in the way of architectural display; nevertheless we expected something striking and picturesque, and in this we were disappointed. There are points in Khiva from which views are very picturesque, but we had entered on the wrong side for that, and the great porcelain tower, almost the only striking object to be seen, was hid from view by intervening walls or trees. Immediately before us, along the interior of the walls, was a wide, open space with a few trees here and there; then a few mud houses and sheds, not more than ten or fifteen feet high; a little to the right a great number of semi-spherical tombs (for there is a cemetery almost in the midst of the city); farther on, more mud houses, taller and more pretentious, with high porches all opening to the north, with trees among them; then the mud walls of the citadel, behind which arose a minaret or two. There was no soul to greet us, but as we entered a long, narrow, winding street, built of bare, black, hideous mud walls, we began to see small groups of men in the lateral streets, in their ragged

khalats and long beards, with hats off, bowing timidly to us as we passed. These were the inhabitants, and they were not yet sure whether they would all be massacred or not. With what strange awe did they gaze upon us as we passed, dust-covered and dirty, after our march of seven hundred miles over the desert, which they had considered impassable — remaining always grim, stern, silent and invincible! We must have appeared to them like some strange, powerful beings of unknown race and world. Then we came upon a crowd of Persian slaves, who received us with shouts, cries and tears of joy. They were wild with excitement, for they had heard that wherever the Russians went slavery disappeared, and they did not doubt that it would be the case in Khiva. Some had already liberated themselves, and I saw several engaged in cutting the chains of three or four miserable beings, shouting the while and laughing and crying all at once in the wildest and most hysterical manner. We passed through the narrow, dusty, crooked street, with bare, blank walls, windowless, and, for the most part, doorless, until we came to the citadel, which we entered by a long, heavy arched brick gateway. Here we had a nearer view of the large town, which now came out in brilliant colors of blue, green, purple and brown. Taking a narrow street, not more than ten feet wide, leading directly toward this tower, we soon arrived upon a place about fifty by seventy-five yards square, which proved to be the great place before the palace of the Khan. One side of this place was taken up by the palace, a huge rambling structure, with mud-battlemented walls about twenty feet high, opposite a new madresa, not yet finished; the other two sides were filled up by sheds and private houses, while at the south-eastern angle of the palace rose, beautiful and majestic, the famous sacred tower of Khiva, which we had remarked from a distance. It was about twenty feet in diameter at the bottom, tapering gradually to the top, a height of about one hundred and twenty-five feet, where it appeared to have a diameter of fifteen feet. It has neither pedestal nor capital, nor ornament of any kind — a plain, round tower — but its surface was covered with a kind of enamel in terra-cotta, brilliantly colored with blue, green, purple and brown, on a pure white ground, arranged in a variety of broad stripes and figures, the whole a most brilliant and beautiful effect. The tower is held in great reverence by the Khivans, and from its top may be heard every evening at sunset the shrill, piercing voice of a moolah calling the people to prayer. The tops of the two towers flanking the palace gate were embellished in the same manner as the large tower, and parts of the facade of its new madresa opposite, not yet finished, were

evidently to be embellished in the same manner. Near the middle of this place was a hole about ten feet square and six feet deep, which, as I afterward learned, was the place in which criminals were executed. We rode into this square and formed around it to await the arrival of General Kaufmann. He soon rode in, followed by the two Grand Dukes and the staff, and was greeted with cheers. Everybody then alighted and entered the gateway of the palace, which was partly obstructed by a heavy brass cannon, rudely cast, and about a twenty-four pounder, I should think. Having passed this we came into a long, narrow, irregular court, branching off to the left and leading to the stables, with a passage to the right leading to the harem, right in front of the main entrance, a mass of low, irregular mud structures, which have more the air of cow stables than any thing else. We all mounted the steps leading up to the stage in the Grand Hall of State, Kaufmann, Golovachoff, the Grand Dukes, Nicholas and Leuchtenberg, staff officers and all, and threw ourselves down to rest, while the band struck up an air from "*La Belle Helene*," followed by another from "*Bluebeard*." As the old familiar music broke upon our ears, and the whole absurd farce of Offenbach appeared to our mind's eyes, we of the younger part of the company set up a shout of delight that made the old palace ring. We had never expected to hear "*La Belle Helene*" in Khiva, and our delight was immeasurable. So the town was taken at last. Count Scobelloff was the first to set foot in the captured city, followed by young Count Schouvaloff, who will be remembered in America as the companion of the Grand Duke Alexis. Having dispersed the Khivans, the Russians marched cautiously in skirmishing line through the streets to the Khan's palace. An amusing evidence of Russian discipline is, that, having made the assault and entered the city without the knowledge or permission of the Commander-in-Chief, they were not at all sure of the comment General Kaufmann, who is a strict disciplinarian, would make upon their victory. They had been in the palace only a few moments when they were informed that Kaufmann was actually entering the city by another gate in great state, having accepted the formal surrender. They thereupon hurriedly left the palace, just in time to give place to the General's procession, which came later. Thus fell Khiva into the power of Russia, after a succession of disastrous expeditions extending over a period of two hundred years.

Mr. MacGahan here related an adventure which he said had taxed all his endurance and qualities of courage in a successful entry into the Khan's harem.

He then continued as follows : Kaufmann soon concluded a treaty of peace with the Khan, exacting and obtaining all the Russians had ever asked for, and more too. The articles of this treaty were as follows :

First. The cession of the whole of the right bank of the Oxus, to the frontiers of Bokhara, with its population of one hundred and fifty thousand souls.

Second. The payment of a war indemnity of two million dollars, or one million five hundred thousand dollars, for the expenses of the campaign.

Third. Liberation of the Persian slaves.

Fourth. A commercial treaty under which Russian merchants should be allowed to trade freely at Khiva upon equal terms with the native merchants, and by which Russian goods should be allowed to enter the country free of duty.

To all these conditions the Khan readily consented, only too glad to retain his throne on any terms. The article relating to the payment of the war indemnity led to a further war with the Turcomans. These latter, the Khan assured Kaufmann, could never be induced to pay, and that it was beyond his power to compel them. The Turcomans, it should be stated, are a nomadic people, living on the eastern shores of the Caspian, inhabiting in part the desert between that and the Oxus. A number of them have abandoned their nomadic habits and have settled in Khiva, without, however, giving up their predatory tendencies. There is a continual state of enmity existing between them and their Uzbek neighbors, who may be considered the landed aristocracy of Khiva, owing to their constant depredations on the property of the latter, so that scarcely a year passes without a fight between them. They are a fierce and warlike race, and have always been able to hold their own against the far superior numbers of the more peaceful Uzbeks. Indeed, it was principally the Turcomans whose marauding habits were the cause of the Russian invasion. The Khan has never been able to do any thing with them. They are always willing to fight for him whenever he wants soldiers, as fighting is in accordance with their tastes ; but they refuse to pay taxes or acknowledge his supremacy over them in any way, although living within his territory. There are six tribes of them in Khiva, numbering about one hundred thousand souls. Of these the tribe called the Yohmoods count about one-half, or as much as all the others together. The Khan has several times tried to subdue them, but always without success. In spite of their want of artillery they have always been able to hold their own, the fight each time resulting in

a drawn battle. The Khan's usual plan of operation is to assemble an army, march into their country and establish himself in a fortified camp. The Turcomans, who enjoy the thing immensely, instantly attack, or pretend to attack, by galloping around the enemy's position on their fleet-footed horses, shouting, yelling, firing their old matchlocks and falling upon small bodies of Uzbegs who may rashly venture outside. The Khan, on his part, throws solid shot at them from his cannon, but as it takes several tons of iron to kill a single man in that way, the Turcomans are not much hurt by it. This usually continues day after day for some weeks, which time is for the Turcomans a veritable holiday. Then the Khan, having expended all his munitions of war, and having eaten up his provisions, makes a treaty with them, which changes their relations in no respect, and then returns in triumph to his capital. Each tribe is subdivided up into many smaller divisions, probably originating in family connections nominally governed by chiefs. But these have no regular form of government. The state is unknown among them. Disputes between each other are settled by arbitration on the decision of their chiefs or old men, but apart from public opinion, there is no power to enforce a decision with either of the disputants. They may submit or fight it out, as they choose; things are just as they were before, with the difference that the one who has public opinion on his side has a manifest advantage over the other. These were the same who kept on fighting after the Khan had surrendered Khiva, and these the people whom he avowed he could not force to pay their share of the war indemnity. As it was only too evident that he had no control over them, Kaufmann determined to take the matter into his own hands. He therefore issued a proclamation to them and sent word to some of their principal chiefs, informing them he wished the whole amount of the indemnity, four hundred thousand dollars, paid in three weeks. They replied, reflecting in general terms upon the strange conduct of the Russians in asking those who were not Russian subjects to pay money. Kaufmann replied by sending an expedition against the Yohmoods, the largest and most powerful tribe among them, who were the most insolent and arrogant, and resolved to attack and disperse them first. This expedition left Khiva the 18th of July, and consisted of fifteen hundred infantry, eight hundred Cossacks and six pieces of artillery, rather a small force to subdue a people numbering one hundred thousand souls. The country of the Yohmoods begins about twenty miles north-west from the city of Khiva, and we reached their frontiers in one day's march. General Golovachoff halted a day to rest the troops, and then entered

their country. But they, hearing of our approach, had simply gathered up their flocks and herds, loaded their household goods on the backs of their camels and fled toward the desert. The torch was applied to every thing they left behind, and in an hour the whole country for miles around was in flames. With the exception of the newly-gathered wheat, however, which was stacked near their houses, of which there were great quantities, there was little to burn. They had carried off every thing, leaving only the bare walls and thatched roofs for the torch. We continued our march, firing every thing that was left, and leaving after us only black and smoking ruins. This continued for five days, during which time we devastated a strip of country four miles wide by about sixty long. This was not accomplished, however, without some severe skirmishing with them. At length, on the 29th of July, General Golovachoff, obtaining information that they were camped some six or eight miles distant, where they were disposed to give us battle, determined to leave his baggage behind, march on in the night and attack them.

Mr. MacGahan continued giving a lengthy account of the Turcoman war, detailing the operations by which the Turcomans were partially subdued; describing the atrocities committed by both parties to the conflict.

GENERAL SHERMAN, on coming forward to address the meeting, was loudly applauded. He said they had heard the only notice he had received—that he was to give them some light and information upon Khiva. He had come there that night to hear his friend, Mr. MacGahan, whom he had listened to with the greatest pleasure. He intended to cross-question him on some points when he had an opportunity of doing so. When he (General Sherman) was in the East two years ago, he received a dispatch that a newspaper correspondent was to join him. This was not welcome news, but Mr. MacGahan came, and he found him a most agreeable and companionable man. He had listened to him with extreme pleasure, and he did not intend, at that late hour, to supplement any remarks made by Mr. MacGahan with regard to the Caucasus which lay between Central Europe and Asia as the connecting link between ancient and modern civilization. It was in the Caucasus they found that beautiful Caucasian race, because they had clean water, and they were accustomed to hear of the praises of the fine race known as the Georgians of the Caucasus. The General described his arrival at Koti, where there was a village or town that was Russian, pretty much like a place in Pennsylvania, and while there a man wanted to sell them town lots, but nobody invested. (Cheers.) There was a railroad

to Tiflis. They expected to find some of the beautiful women of Georgia, but they did not see many. They made the journey to Tiflis partly by rail and partly by carriage. They found there Russians in garrison under the command of the brother of the Emperor, a fine, pleasant, agreeable gentleman, of excellent presence, the Grand Duke Michael. He was satisfied there was a commingling of races passing from the Caspian sea, and pouring into what is now known as the Caucasus. Those races came from the Oxus, and coming into that gorge of the Caucasus intermarried, and their children, having the best of clean water, had produced the Caucasian race. (Cheers.) He had no doubt that the Russians living north of the Caucasus were the dirtiest people they ever saw. He did not believe they ever washed their faces or their bodies; but in the South, where they had water, they were a more cleanly people. The Russians had established civil and military bureaux in Khiva, and he had no doubt that the government was adapted to the people and was as good for them as any that could be given. There appeared to be justice tempered with mercy. A good military system was established, the officers were extremely intelligent, and the Russian soldiers in that country would bear comparison favorably with our own. (Cheers.) The people were mixed with all the races of Asia, and they were at war almost from time immemorial until about the close of the American civil war, when the Russians captured Schamyl, a hero of whom they might have read. They traveled in the country, they paid for what they had, and got little to eat. During the journey he had not received a hard word, and he had experienced no more danger than he had fear of now. He thought that the rule of the Russians in the Caucasus had been for the advancement of civilization, and, therefore, he was glad to hear that the Russians intended to extend their power in the East. When the wild Turcomans and Khivans were subdued, the old Persian Empire would have a chance to rise from its degradation and take its place among the nations of the world. (Cheers.)

A vote of thanks (proposed by Dr. Hayes) to Mr. MacGahan and General Sherman brought the proceedings to a close.

CENTRAL ASIA.

LEGATION OF THE UNITED STATES, }
ST. PETERSBURG, *December 23, 1873.* }

SIR:—I am fully sensible of the great honor which the Society has done me, and accept with great pleasure the membership. As soon as I can get settled down and clear off a little of the work I

found waiting on me, I shall be very happy to send to the Society some papers on Central Asian subjects. At present I can only give you an outline of my route. I left St. Petersburg on the 23d of March, by railroad, and reached Saratof on the 26th. From here I went on sledge and carriage via Uralsk, Orenburg and Orsk to Kazala (Fort No. 1), on the Syr-Darya or Yaxartes, where I arrived April 19. Traveling up the Syr-Darya, through Fort Perovsky, Turkestan and Tehimkent, I reached Tashkent on the 4th of May. Making Tashkent my head-quarters, I made several journeys: 1st, Direct to Samarcand and back, via Djizzak, Ura-Tiobi, Nau and Khodjent; 2d, to Kokand, Balyktchi, Utch-Kurgan, Andidjan, Osh, Margilan and back, taking about a month; 3d, to Samarcand, Urgut, Shahrizalz, Karshi, Bokhara, Kermiveh, Katta-Kurgan and Samarcand, also about a month. I finally left Tashkent on the 9th of September, went via Aulie-ata, Merke, Takmak and the Buam pass to the Lake Issyk-Kul; there from Pishpek to Vierney, Suidun and Kuldja. Making excursions from Suidun to the ruins of Chinese Kuldja and to the Alpine lake, Sairam-Nor, I hurried on through Kapal, Sergiopol and Semipalatinsk to Omsk. From Omsk I returned to Orenburg, by way of Petropavloosk and Troitzk, and reached St. Petersburg again on November 15th.

Hoping soon to be able to send you something,

I am, sir,

Your very obedient servant,

EUGENE SCHUYLER.

ALVAN S. SOUTHWORTH, Esq., *Sec. Am. Geo. Soc.*

SUPPLEMENTARY PAPER ON THE RUSSIAN EXPEDITION TO KHIVA.

By J. A. MACGAHAN.

Although the organization of the Russian campaign against Khiva was remarkable in every respect for its completeness and the admirable way in which the army was supplied with every requisite for a march of ninety days across a waste of sands, the operation of the topographical corps merits especial attention.

It may be as well to state, that as fast as the Russians advance in

Central Asia, they make every provision for the complete exploration and survey of the country. Even flying columns, sent out for the purpose of reconnoitering, are always accompanied by one of two officers of the topographical corps, who make hurried maps of the road, thus enabling future expeditions to pass over the same way with certainty and dispatch. Embassies to Bokhara, Khokand, Kashgar and Khiva have always been accompanied by skilled officers in this service, who not only made secret maps of the road, but ascertained the astronomical position of the different places to which they were sent, with a fair degree of accuracy, without exciting the suspicions of the ever-suspicious Central Asian potentates. Thus Struve, the son of the famous Russian astronomer, accompanied an embassy to Khiva in 1858, and succeeded in determining the position of the town to within a few seconds. Five years since, Baron Kaulbars did the same at Kashgar, while concluding a commercial treaty with Yakub Beg. The same year he made a map of the route to Kuldja, when going to that place to make a treaty with the Khan, over which route he marched less than two years afterward, when leading an invading column against the place. Several routes leading to Khiva had been explored and mapped to within less than a hundred miles of the Khanate, by flying detachments, long before the campaign was undertaken, so that the ground over which the columns had to march, and the amount of water in the different wells, were as perfectly known as could be, allowing for the change of seasons. Even then the army never moved until the ground to the next well had been explored, and the actual amount of water each well would supply, had been estimated. It was only because no Russian had ever been over the ground from Adam Kurulgun to the Oxus (it being impossible to send a small detachment in face of the Khan's troops), that Kaufmann's march was nearly ending disastrously at Atti Kuduk. Although he had fifteen or twenty *jiggits*, or native guides, he could not place sufficient reliance upon them individually or collectively to be sure of the safety of his army. He gave me a curious instance of the uncertainty of the information obtained from these guides. When General Chernayef was making war on Bokhara, he was on one occasion within five miles of a mountain pass, which, had he known it, would have saved him a march of fifty miles, and yet he never obtained from his guides the slightest hint of its existence. The Russians, therefore, never move a step, where it can possibly be avoided, without first seeing the ground for themselves.

The triangulation of Turkestan has already been commenced, and

is progressing so favorably that the whole of Central Asia, up to the frontiers of India, can probably soon be accurately mapped. In addition to this, nearly the whole of the Thian Shan and Kuen Lun mountains has been explored by Russians, and almost every scientific fact of interest connected with them communicated to the Russian Geographical Society. The most curious part of it is, that little is ever known of these explorations to the outside world. The Russians, either through indolence or want of literary spirit, do not write interesting descriptive accounts of travels and explorations that possess the most lively interest to every body caring the least for travel and adventure.

A dry *resumé* of facts and figures, covering perhaps a dozen pages, or a paper of the same kind read before the Royal Geographical Society, is all we ever get out of explorations and adventures on which volumes might have been written, which would be read with interest and pleasure.

Baron Kaulbars, for instance, has spent nearly three years in the Thian Shan mountains, and has accumulated a mass of valuable material, which, with the exception of a dry abstract, has never seen, and probably never will see, the light. He has written nothing, or next to nothing, about the country which no one but himself has seen, and of which absolutely nothing is known to the world. While on the subject of the Thian Shan mountains, I may as well remark that a good road has been made through them to within seventy-five miles of Kashgar, over which artillery may pass with ease.

During the Khivan campaign, the operations of the topographical corps were extensive. The whole road was measured step by step, every turning accurately marked by means of the azimuth, and even the slightest variations in the character of the ground carefully noted. I afterward passed over a part of the road traversed by the army, with one of these maps in my hand, and remember well my astonishment at finding kirghiz, tombs, domes, heaps of brushwood, and even the character of the sand, carefully marked. These maps were made as it were in the saddle, and up to the moment when the army was confronted by the enemy, the topographical corps, protected by an escort, preceded the army often by a day's march, and continually sent back maps of the route. The astronomer of the Orenburg detachment, having ascended a hill one day, a short distance from the line of march, to take an observation, suddenly found himself and his two or three assistants surrounded by a dozen Turcomans, and only escaped after a gallant resistance, with two or three

slight wounds, and the loss of some of his instruments. I can answer from personal observation for the pains bestowed by the astronomer who accompanied Kaufmann's detachment, Lieutenant Serovatsky. At every important point along the route, such as at Aristau-Bel-Kuduk, Khala-ata, Uch, Uchak Sheik Arik, Shura-Khana, as well as at Khiva, he made a series of observations, which he reduced to the greatest nicety and exactitude. He took sixteen to twenty altitudes of the sun every day, before and after meridian, as well as at the meridian itself; every eclipse of Jupiter's satellites, and an occultation of Venus. Practical astronomers, who know what it is to take altitudes, will appreciate the labors of Serovatsky working for hours with a desert sun burning his eyes and scorching his brain. I think it is more deserving of note, as General Kaufmann, while thoroughly appreciating the value of the work, seemed to have little regard or consideration for the workman, and the care bestowed by Serovatsky was done through a pure love of science. Serovatsky determined in the same careful way the position of the towns of Kunia-Urgenj (old Urgenj), Khanki Kungrad, Hioli Kipchak, and two or three points on the Oxus, while the other officers of the topographical corps mapped the river itself. In addition to this the principal roads and canals and the boundaries of the oasis were marked out; the supposed ancient bed of the Oxus was explored as far as Ak Kumish, and has probably during the present summer been continued to the Caspian sea, and the much vexed question of the former course of the Oxus finally decided. I may remark here that Baron Kaulbars was of the opinion that the river formerly had flowed in the bed ascribed to it, whereas General Kaufmann maintained that it was almost impossible it should have flowed so near the Aral without flowing into it, and that it could not, therefore, have ever flowed into the Caspian. This, however, does not follow, as it may have, when there was more water than at present, flowed first into the Aral, and into the Caspian afterward. Whatever be the truth of the matter, I think it little likely, that a river like the Oxus should be turned aside by the Khivans, as has been asserted, and that if its course has been changed, or, more properly speaking, shortened, it is owing to the decrease in the volume of its waters, or, what is more probable, of the waters of the Aral sea.

To return to the operations of the topographical corps. The way in which distances by the road, or what mariners would term the "dead reckoning," was kept, deserves notice. A Cossack, whose horse dragged a surveyor's chain some fifty yards long, drew with a

long staff a mark in the sand, as each length of the chain was measured off. Another Cossack rode behind and called to him when the end of the chain had reached the mark, when another length was measured off. A third rode along and kept tally. This was kept up the whole distance to Khiva, even through the most trying days of the campaign, and those three Cossacks became so absorbed in their work as to not pay the slightest attention to what was going on around them. During the whole of one day, when the Turcomans were harrassing the march of the army, these men continued their task without the slightest interruption, and one would hear their "mark," "mark," as regularly as clockwork, while a continuous fire was going on all around them, and the Turcomans were hovering around, and making sudden dashes on the vanguard, rear and flanks of the army. And yet, I do not think these Cossacks, who did their work so faithfully, ever received any reward for their services in the way of extra pay. There is little to be said about Khiva that has not already been said. The way in which the irrigation is carried out would, however, probably have some interest for an engineer. It is very simple. The waters of the Oxus flow into the country through a number of large canals, which, acting as feeders, distribute it over every inch of ground in the Khanate, by means of a network of smaller canals and ditches. In many parts of the Oasis, there appear to be two levels. One for feeding, and the other for drainage, so that the water has only to be let on and off the fields by means of sluices. For the most part, however, the land is from one to five feet higher than the water level, and the water is raised to the required height by means of wheels. These wheels were of a very simple construction. They were of rough pieces of wood, often the trunks and branches of the poplar and elm, with the bark on, and the water was caught up and lifted by earthen jars tied to the circumference of the wheel. It was turned by a horse, by means of a large horizontal wooden cogwheel fitting into a smaller one on the axle of the irrigating wheel. I never saw one more than eight feet in diameter, showing the water was never raised more than five feet. The wheel seems to be a favorite spot for the inhabitants of Khiva. Trees are planted around it, vines are made to twine over the trees, and a shady bower thus constructed. Cushions and rugs are placed about on the ground, and here the Uzbek family pass hours; the women spinning and sewing, the men taking tea, eating their pillooff, smoking their pipes, gossiping with neighbors, or dreamily listening to the regular splash of the water.

The soil is very rich and productive, and I never anywhere saw finer fields of wheat, barley and rice, or more beautiful fruits.

I noticed a strange peculiarity in the soil in one or two places. It seemed to bend beneath the weight of even a single man, and there was in one place four or five acres over which the army passed, that sunk and rose beneath each piece of artillery and each camel, and rolled about like the waves of a sea. The spot was covered with a rich growth of grass and weeds. I can only account for it by supposing the place to be a marsh or lake, which the grass and water plants had in the course of time bridged over.

IV.

ADDRESS

BY HON. JOHN M. FRANCIS.

SUBJECT: GREECE AS IT IS.

Chief-Justice DALY, on taking the chair, said:

It is just fifty years since the first blow was struck for Grecian independence, and it was many years afterward before the independence of Greece was fully achieved. We are to listen to-night to a very distinguished citizen of this State, who represented our country at the court of Athens for some time, and returned at his own solicitation; who, while at Athens, had every opportunity to observe every thing around him. I should like to speak at greater length this evening, and to say something further on this subject, as it is now a matter of great interest, and one of the most important movements of modern times. I still remember with undiminished feeling, the slaughtering of ten thousand of the inhabitants of one of the Grecian islands; but this only characterized the barbarous rule of the Turks over Greece. I felt then, and I feel now, that the most accursed obstacle that stands in the way of civilization, is the Mohammedan rule, wherever it exists. Fortunately, the Greeks were rescued from that rule. And now it is of great importance to learn the result, which will be given by Mr. FRANCIS. I have now the pleasure to introduce to you the Hon. JOHN M. FRANCIS, late United States Minister to Greece.

Mr. FRANCIS then read an elaborate paper on

GREECE AS IS IS.

MR. PRESIDENT, FELLOWS OF THE AMERICAN GEOGRAPHICAL SOCIETY, LADIES AND GENTLEMEN:—I propose to speak of Greece as it is.

Ancient Greece I need not here discuss. You know it as it was, with all its grand associations, its elements of knowledge, and poetic inspiration constituting the basis of our common civilization. Nor shall I dwell upon the circumstances of its achievement of national independence after subjection for hundreds of years to Turkish domination. The Greece of to-day claims our attention. It is a living reality. But it is largely misapprehended, and often misrepresented. I find that even many of our scholars have very imperfect ideas of modern Greece. It stands out on the map a little jagged kingdom, embracing mainland, peninsula, isthmus, and many islands, literally ribbed with mountains overlooking the sea. But circumscribed as it is in territorial area, and embracing only a small part of what constituted ancient Greece, this kingdom exercises sovereignty over what was in the past the most interesting portion of the globe — over Attica, with classic Athens; over Thebes, Parnassus, Delphi, Sparta, Corinth, Mycenæ, Tyrins, Ithaca, and many other localities, wherein a great and wonderful history was wrought out in the early ages.

PROGRESS OF GREECE.

Greece embraces an area of some fifteen thousand square miles. Its population numbers about one million six hundred thousand souls. The country has surely made progress. Forty-four years ago, at the close of the sanguinary war of the revolution, the people were very poor. The estates of the wealthy had been devastated, and their proprietors were overwhelmed with debt, or reduced to penury. The people were poverty-stricken. For eight long years their energies had been enlisted in a desperate struggle for independence. The cultivation of the soil had been neglected; all the interests of industry had been diverted in the supreme effort for the achievement of national independence. There was not a village of tolerable size in the kingdom. Athens was reduced to a mere hamlet, containing less than one thousand inhabitants. There was not a first-class dwelling-house in the place. The people, for most part, lived in mud hovels clustering about the Acropolis. Now, this charming capital of Greece has a population of more than fifty thousand souls. Its architecture will compare favorably with that of any other city of its size in Europe. Athens was largely rebuilt under the reign of King Otho, and bears a striking resemblance to German cities, in the peculiarity of its edifices. It has many imposing and costly public and private buildings. Among the edifices nearly completed, are the Academy of Art, the Polytechnic Insti-

tution and Museum, and the French Academy, each costing about \$1,000,000. There are fine streets and delightful boulevards. The work of building and city improvement, now going on, is very large, reminding one of the progress of our enterprising American cities. Then, there are the important and growing seaport towns — the Piræus, near Athens, with a population of 12,000 to 15,000; Syra, the chief town and commercial mart of the Cyclades, population 25,000; Patras, principal seat of the currant trade of the Peloponnesus, and with a larger foreign commerce than any other port of the kingdom, population quite 30,000 and steadily increasing; Zante, chief town of the lower group of the Ionian islands, population 20,000; Corfu, of the upper group, and the old capital of these islands, now the summer residence of the court, population over 20,000. To these may be added Cephalonia, on one of the islands of the same name, noted for the production of wines and currants; population estimated at 5,000. In continental Greece, there are Arachova, on a spur of the Parnassus, commanding sublime views of mountain and valley scenery; population 3,500. Lebadea, in Beotia, the center of a fertile region, and the mart of the increasing cotton interest of that rich section; population 5,000. And Thebes, on the site of ancient Thebes, now quite a thriving modern town of two thousand inhabitants, with a rich and beautiful adjacent country. In the Peloponnesus, there are the villages of Nauplia, Argos, and new Corinth, of 3,000 to 4,000 population each, and several smaller villages on the islands and elsewhere, of five hundred to one thousand inhabitants.

These brief details will serve to show that this little kingdom has accomplished something in the way of progress, since the achievement of its independence forty odd years ago.

I will here present some facts illustrative of the resources of the country, and their development. These will afford a basis for accurate judgment, as to the material condition and progress of Greece: Prior to 1841, there was no banking establishment in the country. Now, there are four large institutions at Athens, having branches in all the principal towns of the kingdom, with a paid-up capital of some \$12,000,000. The issuing of notes, however, is restricted to two banks — the National and the Ionian; and their circulation is now about \$7,000,000. This would be equivalent to a paper currency in the United States, the population of the two countries taken into account, of about \$210,000,000, which was, I believe, the largest volume of our paper money before we entered upon the policy of inflation during the late war. The banks of Greece are

sound institutions, and specie payments have always been maintained by them. In addition to bank notes, there is a great deal of gold, silver, and copper money, in circulation; the gold consisting of English sovereigns and French napoleons, silver of coinages of nearly every country, our own American half-dollar often appearing in the variety afloat, and copper of Greek coinage from the value of two cents down to one-fifth of a cent, the *lepta*, known as the widow's mite of the scripture. The paid-up capital, with reserve, of the four principal insurance companies of Greece, aggregates \$1,656,000. Other and smaller insurance organizations would probably increase the amount to \$2,000,000.

The only steam navigation company in Greece, founded in 1857, has a paid-up capital of nearly \$700,000; it owns ten steamers, of 5,090 aggregate tonnage, which ply exclusively in Greek waters. The machine works of the company are located at Syra. Another steam navigation company has recently been organized by Greek capitalists, with a capital fixed at \$8,000,000, with head-quarters at the Piræus. It is intended to provide first-class steamers to run between the chief ports of the East and France, Italy, England, and ultimately the United States. The mercantile marine of Greece is larger than that of any other country in the world, population considered. It includes no less than 2,170 vessels of all kinds, with an aggregate tonnage of 431,054, about one-sixth the tonnage of all American vessels afloat. The Greek islanders pursue the marine avocation as generally as did their ancestors before the Christian era, and no country can boast of better sailors.

RAILWAY AND OTHER IMPROVEMENTS.

Greece has been very backward in the matter of internal improvements. There is but one passenger railway in the kingdom, the short line of five miles between the Piræus and Athens. In the interior there are few common roads over which vehicles can be driven. Produce is brought to market on the backs of donkeys, over rough ways and bridle-paths. There is a fine turnpike of sixty miles from Lebadea, in Beotia, by way of Thebes, to Athens; that is the longest and best highway in the country, though there are good drives for a few miles out of Athens, and some other of the larger towns. The country needs railroads and common roads for further development and prosperity, and now the work of supplying these has been undertaken in earnest. A concession has recently been granted by the government to reliable and enterprising capitalists, mostly Greeks of Constantinople and other European capitals, for

the construction of a railway from Athens to Lamia, on the Turkish border. Work upon this road has been commenced, and according to the terms of the contract with the government, it is to be completed within three years. This railway will be of great importance to Greece, as it will unite the capital with three of the important towns of the kingdom, namely Lebadea, Thebes and Lamia; will traverse the fertile plain of Lake Copais; will give ready access to Chalcis and the island of Eubœa, and will bring the capital within five or six hours of the frontier, thus dealing a death-blow to brigandage, for it is there that the most of that plague lies. It is believed that the Turkish railway will be extended from Salonica to Lamia, and if this enterprise is accomplished, as promised, Athens will be brought by the Lamia line into railway communication with the rest of Europe, and the effect would also be to strengthen the friendly relations now beginning to exist between Turkey and Greece. A concession has also been granted for a railway from the Piræus to Patras, to be completed within three years, by which the journey from Athens to Paris may be shortened nearly two days by connecting steamers running between Patras and Brindisi; also for lines of railway penetrating the rich districts of the Peloponnesus, embracing, say, 150 to 200 miles more. Measures, too, have been adopted for the construction of highways where they are most needed, the government paying a small proportion of the cost, and authorizing the company constructing them to levy moderate tolls. Under the agreement made, thirty to forty miles of new roadway will be opened annually for several years to come. These various works have been commenced, or are about to be entered upon, and within a decade from this time there is reason to believe very important results will have been accomplished for the more rapid progress and development of this rich kingdom — rich, I mean, in natural resources, and surely favored in respect of soil and climate. There is ground for hope, therefore, that the near future will introduce to the world a "living Greece" once more.

Another project of great importance to commerce, and for which government concession has been obtained, is the construction of a ship canal across the Isthmus of Corinth. This improvement, when completed, will effect an immense saving of time and expense in the course of commerce between the West and East, and shorten the journey from Brindisi to Athens and the Levant at least one day.

AGRICULTURAL IMPROVEMENTS.

Agriculture, as throughout the East, and also in some sections of

Western Europe, as I have observed, is generally pursued by the ancient methods of labor—the one-handed Homeric plough and other rude implements, the sickle and the ancient spade. Threshing machines are almost unknown, as are also winnowing machines for the separation of the chaff from the wheat. The latter work is accomplished by utilizing the wind on a breezy day—throwing the substance into the air, shovelful at a time. Movements have recently been inaugurated for the amelioration and improvement of the agricultural interest, an object well worthy of governmental encouragement. A society of capitalists has been formed, under a concession granted by the government of a large area of arable land; agricultural schools are to be established, labor-saving implements employed, and the soil worked in accordance with the latest methods of farming. Thus the earnest effort is to be made to popularize and dignify agriculture, as well as to render it a source of larger profit and prosperity than have heretofore been attained in this important branch of industry. There are about 16,000,000 acres of arable land in the kingdom, but of this less than 6,000,000 acres are under cultivation. Millions of acres of fertile soil may be brought into use, and with the improved modern appliances for that purpose, the wealth and prosperity of the country would soon be immensely augmented. It is a favorable sign for the future of Greece that the earnest attention of its capitalists and statesmen is now directed to the development of the agricultural and other resources of the kingdom.

Propositions and offers are pending for the draining of the celebrated Lake Copais in Beotia, which, once effected, will bring into use thousands of acres of fertile land, now to a large extent constituting an unhealthy marsh, disseminating disease throughout that section of the country. Thus a great deal of valuable land may be reclaimed, the waters utilized for irrigation and other purposes, and the public health largely promoted by the removal of a cause of malarious fevers. Similar propositions are also under consideration in regard to the smaller lakes Paracheloitis, near Messolonghi, and Pheneus, near Tripolis.

MINERAL, MARBLE AND OTHER RESOURCES.

Greece is rich in mineral resources and marbles. Nearly all the known metals are to be found in the country; but iron, argentiferous lead and copper ores are very abundant, and these appear to have been the metals most worked by the ancients. The other most noteworthy substances are: 1. Chromium, in Attica, the island of Eubœa and other parts of Greece. 2. Whole mountains of magnesia, prin-

cipally in Eubea. These two articles are largely exported to France and England in their natural state. 3. Amianthus, in the islands of Milos and Eubea. 4. Sulphur, in Milos, Corfu and Calamaki (Isthmus of Corinth). 5. Chalcedony (white agate), in Milos. 6. Coal, chiefly of the lignite species, in Eubea, Attica and many other parts of Greece. The veins found in Komi are of six to ten feet thickness, and a little farther off are detached layers of eighteen to twenty-five feet thickness. There is said to be plenty of this coal to supply the country, and with proper means of transportation provided, it will no doubt be generally introduced in the chief towns. 7. Emery, principally in the island of Naxos, exported in its natural state chiefly to England. 8. Argil (potter's clay), in Milos, used for the manufacture of crown glass. 9. Gypsum, in Milos, extensively used in the plasterers' and other trades. 10. Porcelana, a quality of earth in the island of Santorin, invaluable for dock masonry, and found to be quite equal to the famous Portland cement. 11. Pumice stone, alabaster and ochre in many parts of Greece. 12. Lithographic stones in the island of Naxos and in Leucadia, mill-stone in Milos and Cimolos, and granite in the island of Delos and in Laurium. 13. Marbles in great variety, of the finest qualities and beautiful colors, as follows: The famous white marbles of Mount Pentelicus, and of the islands of Paros and Skyros; black in Gythium, Skyros and Eubea; red in Gythium and Skyros; green in the island of Tenos; bluish and gray in Attica, Tenos and Laconia; composite and variegated, in great variety and very beautiful, at Skyros.

There are many hot and cold mineral springs in Greece, the healing powers of which are highly commended. The most celebrated are those of Œdipus, Hypate and Cyllene, and on the island of Thermea or Cythnus. Those of Hypate and Cythnus are hot. In the first two and in the last of these places there are bathing establishments, frequented during the season by many invalids.

In Zante there are several sources of petroleum, and a company has recently been formed to utilize the same.

Some of the finest marble quarries of Greece have been opened within a few years past. Those of Pentelicus and Hymettus have been worked quite actively during the past thirty-five years.

The mineral resources of the kingdom, as enumerated, are being slowly developed. Within the past year there has been more activity in this direction than ever heretofore. There are no doubt sources of great wealth, if properly availed of, in these treasures of nature.

THE LAURIUM MINES.

But the point of greatest interest in connection with mines and mining in Greece is yet to be referred to — the Laurium mines, and the great works for the production of argentiferous lead at Ergastiria by the seaside in that district. The location is in Attica on the point of land extending into the *Ægean* sea, and terminating with Cape Sunium. Here is a district of some seventy square miles wherein many ancient mines are found, with scoria and *ecvolades* in abundance. The scoria is the refuse left after extracting the lead and silver; the *ecvolades* the material left by the ancients in the vicinity of the mines, which was rejected by them as not sufficiently valuable to pay the cost of working by the imperfect methods then in use. These mines were worked most profitably and extensively long before the Christian era; they contributed largely to the treasure that enriched Greece, strengthened it to beat back the Persian hordes, and enabled it to build those immortal monuments of national grandeur that crown the Acropolis at Athens. But nearly two thousand years ago the working of these mines was abandoned as no longer profitable; and until within a period of a dozen years the country embraced within the mining section remained pretty much as it was left by the ancients, with only accretions to the surface caused by the natural processes of vegetable decay, and by the growth of a scraggy shrubbery which would hardly be entitled to the name of forest. The country is mountainous, the surface very rough. Here and there shepherds had settled, hovels and sheep-folds being the only evidences of human improvement or habitation. Occasional bridle-paths were to be seen along the rough ways of the mountain leading to the sea, and one in the direction of Athens which terminates near the temple of Sunium in a very poor roadway leading to the capital. But the country was almost a desert. Scientific exploration, however, determined that there was value in the refuse left by the ancient miners. The result was that a concession was obtained from the Greek government by a Franco-Italian company in 1861, assuring to the said company under certain conditions the ownership of the scoria within a prescribed district where it was found in largest quantities, and also of the ancient mines within such boundary. The company established extensive works by the seaside, at a place named Ergastiria, and commenced active operations in the production of argentiferous lead from the smelting of the scoria in 1864 or 1865. The enterprise turned out to be a very profitable one; but a serious dispute arose between the government and the company in 1868. It was ascertained that the company were using

the *eevolades*, the refuse material from the mines which lay in conical heaps over a large surface of the territory. The *eevolades* was not named at all in the government concession to the company; only the *scoria*. The government forbade the use of the *eevolades* without proper compensation for the same under a new agreement to be made between the parties. The company insisted that the concession of the mines implied also the ownership of the *eevolades* that had been extracted therefrom more than two thousand years ago, and therefore refused obedience to the government mandate. The government thereupon stationed soldiers upon the ground to prevent the further alleged confiscation of this property. The company appealed to the French and Italian governments to protect them in the possession and use of what they called their property. And here diplomacy began. The two governments named proposed that the question of difference between their subjects who deemed themselves aggrieved, and the Greek government that had forcibly interfered with them in the pursuit of their business, should be submitted to foreign arbitration for settlement. The Greek government declined the proposition, claiming that it was a domestic question; that outside powers had no business to meddle with it at all; that the Greek courts were open for the trial of this or any other case wherein parties felt themselves aggrieved; that this would necessarily be the course of proceeding if the company were composed of Greek citizens; and that there was no good reason why foreigners should have an exceptional privilege to carry their case out of the country and involve it in the complications of foreign diplomacy and arbitration. The correspondence on this subject was long continued, and toward the conclusion became very acrimonious, the little kingdom, however, not yielding an inch to the demands of France and Italy. But the difficulty was finally solved through the agency of private enterprise. Mr. Syngros and other Greek capitalists purchased all the interest of the Franco-Italian company in the mines and mining property at Laurium, paying the company \$2,300,000 directly and liquidating arrears of taxes due the government amounting to \$800,000 more. The purchase was consummated just one year ago. A joint-stock company was at once formed with a capital of \$4,000,000; the stock was immediately taken, and with it there has been a good deal of wild speculation after the manner of the most exciting operations in our Wall street. Many a poor fellow has been tossed up by the bulls and fallen dead-broke.

As to the value of the *scoria* and *eevolades* at Laurium, the report of the scientific commissioners appointed by the Greek government fur-

nishes the only data at hand. They present at length the details of measurement, cost of production of the lead, etc., and estimate the net value of the scoria at about \$5,800,000, and the value of the ecvolades at about \$21,800,000. These figures, so far as the scoria are concerned, refer to the total quantity to be found all over the Laurium lands; the figures referring to the ecvolades relate only to those lying within the area of about 10,000 acres, embracing the mines conceded to the Franco-Italian company. The ecvolades found in other parts of Laurium far exceed the quantity represented in value by the figures presented; so that, according to this report, the value of both the scoria and the ecvolades lying within the district must amount to some \$50,000,000. Then, besides, there are the ancient mines, of which Mr. Sarpieri, the chief superintendent and principal proprietor of the works under the Franco-Italian company's ownership, said to me a few months since: "Properly worked they will furnish material for the production of more than forty tons of lead per day for a period of one hundred years." Of the scoria the larger part has already been smelted; but there is left of it a sufficient quantity when intermixed with the ecvolades to feed the existing furnaces six to ten years more.

Of the works established by the Franco-Italian company, now owned and operated by the Greek organization, it must be said that before Mr. Sarpieri, the Italian chief manager and projector of the enterprise, had set foot upon Laurium, the land, as we have tried to describe, was almost a desert, and frequented only by stray shepherds. It is now the center of perhaps the greatest industrial activity in Greece. The safe little port of Ergastiria, where a few years since a vessel was seldom seen, is now alive with Greek, French and English shipping. This port, which is forty miles from Athens by land, but which can be reached more conveniently by sea from the Piræus by six hours' steaming, appears to have been the chief station of the ancient smelting works; and after the lapse of about two thousand years has again been made the center of a similar industrial enterprise. Along its shores a village has sprung into existence, as if by magic, peopled by almost three thousand souls, provided with a church, schools, shops, and all the concomitants of comfort and prosperity. The Franco-Italian company laid out in the country around excellent carriage roads of about forty miles length for the transportation of scoria and ecvolades; and with the same view it also constructed a railway of seven miles length, including the cutting of a tunnel of nearly one thousand feet. The trains of freight cars are run zig-zag up the mountain to a height, I should say, of one thou-

sand feet, where the principal scoria beds and eevolades appear in largest quantities within a circumference of ten thousand acres upon the plateau. The company's establishment consists of work-shops, engine-houses, laboratories, lead refineries, stables, an infirmary, together with a railway. They have eighteen Castilian furnaces, nearly all of which are worked both night and day, a strong volume of air being constantly driven into them by two eighty-horse power engines. The poisonous, noxious fumes from the furnaces are carried off through a conduit 3,700 feet in length, to the top of a neighboring hill, where they are discharged. Large quantities of metallic atoms adhere to the interior of the conduit in the passage of the fumes, and on being scraped off are again smelted. Some four hundred tons of scoria, with a proper admixture of the eevolades, are now smelted daily by the furnaces, producing from twenty-five to thirty tons of argentiferous lead. The quantity of such lead exported from Ergastiria in 1870, was 8,670 tons, valued at about \$900,000. The number of workmen constantly employed is about 2,000, nearly all Greeks.

By the convention between the new company and the Greek government, the latter is assured forty-four per cent of the net income of the Laurium works, and it is believed its revenue from this source for the year ending in June next will be between \$300,000 and \$400,000. The previous year it received only about \$32,000 from the Franco-Italian company.

This great enterprise, worked up to the extent contemplated, characterized by efficiency and proper economy of management, must prove a source of great pecuniary advantage to the kingdom, and give steady employment to probably not less than six to ten thousand persons. It is surely one of the wonders of our times, that modern science lays hold of elements thrown aside as useless by the ancients, and converts them into a wealth that goes far to enrich a whole kingdom. This is one phase of classic Greece, wherein certainly there has been material improvement even over the grand achievements of the men who lived in the most renowned days of its intellectual greatness and glory.

OTHER MINING COMPANIES.

The Laurium controversy and the large profits which it was alleged the Franco-Italian company were deriving from the resmelting of the scoria, drew public attention to the mineral resources of the kingdom, and the result is that concessions have been granted by the government on petitions presented for the working of mines cover-

ing an area of more than 600,000 acres of land, or about a sixtieth part of the whole superficial area of the kingdom. Many of the concessions are worked by private individuals; but a large proportion is under the ownership and direction of organized companies, the stock for which has been for most part subscribed. Of all the companies, however, only the Hellenic Mining Company, which is under the special patronage of the king, has thus far made any earnings. Last year it declared a dividend of eight per cent. It possesses extensive mines of different metals in several parts of Greece. The company is now engaged in constructing works for smelting the superior iron ore of the island of Seriphose. Accomplishing this, it will be the first to inaugurate the manufacture of iron in the kingdom, and this will mark an epoch in the history of Greece. The iron ore referred to is now shipped in large quantities to Newcastle, England, where it is smelted by the Royal Greek Iron Works. The company derives a large profit also from its mines of chromium and from its coal mines in Eubea, which extend over an area of 16,000 acres.

COTTON PRODUCTION AND MANUFACTURES.

The production of cotton is becoming an important interest in Greece. Previous to our late civil war but little was raised, but the blockade of our Southern ports and the consequent cotton famine abroad, stimulated the production of the fibre in Greece, so that now the average crop of the country amounts to about 5,500,000 pounds. The principal cotton producing district in Greece is that included in the fertile provinces of Lebadea, Beotia and Locris, the center of which is the town of Lebadea. The district of Lamia near the Turkish border, some sections of the Pelopennesus, and a few of the adjacent islands, produce almost one-quarter of the aggregate crop. The quality of Greek cotton is fair, but not equal in fineness and strength of fibre to the American article. The prices at the Piræus of the ginned cotton pressed in bales last year averaged twelve to fourteen cents per pound. Previous to 1862, the work of separating the seed from the fibre was effected by the rude native mechanism; since that period, however, modern cotton gins have been introduced for this purpose, some sixty of these being employed in different establishments in the principal cotton mart of Lebadea. Formerly the cotton was all exported; now a large proportion of it is manufactured into cotton yarn, no less than sixteen factories having been established for this purpose, employing 25,460 spindles, the yearly manufacture of which amounts to 2,200,000

pounds of yarn of different qualities. This Greek yarn is largely displacing the English article in many of the Levant markets. At the present time more than three-quarters of the cotton crop is consumed by these factories and by old methods of home manufacture, less than one-fourth being exported, principally to Marseilles and Trieste. Large works for the weaving of cotton cloth, the first in Greece, are now in process of construction at the Piræus.

SILKS AND MANUFACTURES OF SILK.

The manufacture of silk is one of the oldest of the trades in Greece, dating as far back as the period of the Byzantine Emperor, Justinian, during whose reign it is related that two Greek monks succeeded in evading the Chinese law, which prohibited the exportation of silk cocoons from that country, by filling their hollow walking canes with the cocoons, and thus introducing the valuable worm for the first time into Europe. Extensive plantations of mulberry trees, upon the leaves of which the silkworms feed, were at once established throughout the empire, and as the cultivation of this tree succeeded so well in the Peloponnesus, that peninsula was called *Morea*, signifying mulberry tree. At present the mulberry groves cover an area of about 70,000 acres of land, containing 1,800,000 trees. On these feed worms producing 1,281,072 pounds of cocoons, valued at more than \$500,000. There are eight silk manufactories in the country, whose productions, a large proportion of which is exported, amount to upwards of \$750,000.

THE VINE AND THE OLIVE.

The culture of the vine and the manufacture of wine and spirits constitute an important industrial interest in the country. The vineyards in Greece cover about 500,000 acres of land, or one twenty-eighth of the area of plantations properly so-called. About 2,000,000 barrels of wine are expressed, and of this aggregate less than 100,000 barrels are exported, leaving the remainder for home consumption. The gross value of the total production is about \$1,600,000. The common wines in general use in the country have an offensive taste to foreigners, though relished by the natives, in consequence of the mixture of resin with the juice for its preservation. The wine, however, is light and is said to be very pure. Latterly, improved processes of manufacture have been introduced, and the wines of Santorin, of Cephalonia, Caphissia, of Patras and of Corinth are of superior qualities. They find a ready market in London, and are by

many preferred to the French wines on account of their delicacy, mildness and flavor. The great variety and large quantity of grapes produced in the country render the manufacture of wines an important interest, which is gradually being developed into a profitable enterprise.

The cultivation of the olive tree, like that of the vine, is very ancient and most extensive in Greece. The olive is largely cultivated in the environs of Athens, and in the provinces of Corinth, Patras, Enos and Salona, and on the islands of Corfu and Paxos. The latest statistics show that there are about 8,000,000 of olive trees in the kingdom, covering an area of 350,000 acres, and producing annually 22,000,000 pounds of olives. These numbers do not include the Ionian islands, which produce an amount quite equal to the remainder of Greece. The manufacture of oil was, until a few years ago, carried on throughout Greece by very rude and primitive methods; now, improved and modern machinery is used for that purpose. Three kinds of oil are generally produced: 1st, the so-called virgin oil, being the result of the first gentle pressure of the picked ripe fruit; it is yellow-greenish in color, sweet to the taste, and almost destitute of odor. 2d, the common oil, produced by pouring boiling water on the general crop of olives, and subjecting them to the requisite pressure. This oil soon acquires a rancid taste. 3d, the common oil, which is produced as last described, but from inferior and fermented fruit. The first two kinds are largely used for local consumption (food and light). There is also a large and increasing exportation of the article, which stands next to currants in the amount realized from sales for shipment. The value of oil exportations from Greece now amounts to upwards of \$3,000,000 annually.

IRON AND OTHER MANUFACTURES.

There are several manufactories for the production of iron machinery in Greece, two of the most notable of which are located at Syra and Piræus, working upon a capital of nearly half a million of dollars, and manufacturing iron machinery of almost every description. The superintendent of the works at the Piræus, a native Greek, was educated to his trade in Boston, mainly with the view of being able to introduce this branch of mechanics in his native kingdom. For this purpose he is now endeavoring to organize a company in the city of Athens. There are three leather tanning establishments in Syra, working upon a capital of \$700,000. This is a large and growing interest in Greece, the productions of which

meet with ready markets throughout the Levant and Danubian principalities.

The potter's art, which produced in ancient times those inimitable Greek vases we now see preserved in museums, though it possesses every element for success in Greece, is still in its infancy; but great exertions are being made to revive it. There are several manufactories in the environs of Athens, and in Corfu and Zante.

A company has recently been formed, with a capital of \$600,000, for the manufacture of chemical products from the rough material so plentifully offered in Greece, namely, the conversion of chromium, which is now exported at a comparatively low price, into merchantable salts; the manufacture of sulphuric acid from the excellent sulphur of Milos and other parts of Greece; the extraction of soda from the plentiful sea salt of the government salt pans of the kingdom; of iodine from sea-weeds, and citric acid from the abundant lemon crops of the island of Poros.

EXPORTS OF THE KINGDOM—PRODUCTIONS OF THE SOIL.

Greece exports annually \$6,000,000 to \$8,000,000 of currants, known here as Zante currants, there as Corinthian grapes. The larger proportion of the crop is shipped to England, but the demand for the fruit in the United States is yearly increasing. Thus, of last year's crop, 4,690 tons were shipped direct to this country, up to the 13th of December last, against 2,860 tons so shipped during all the previous year. The exports of olive oil amount to nearly \$4,000,000 annually, and of cotton and cotton yarns, silk and products of silk, coarse wool, wines, etc., the value is quite large. The exportation of lead and other minerals is very large. As we have seen, the mines of Laurium yield twenty-five to thirty tons for export daily. The marbles of Greece are among the finest in the world, but their exportation is comparatively limited, owing to the want of proper communication for delivery from the richest quarries to the seaboard. With such communication provided, as is likely to be the case within a reasonable period, these quarries may be rendered a source of large gains to the country.

There is much fertile land in the Pelopennesus, and on many of the islands—notably on the largest one, Eubœa—and on the Crisean, Copaic, Thebes and other plains of continental Greece. In some parts two successive crops of cereals are produced in a year. But Greece raises scarcely sufficient breadstuffs for home consumption, owing no doubt to the difficulty of getting the produce to market; and so it is found that the cultivation of the olive and the

grape, the growing of wool and cotton, and the production of silk, are more profitable. There is no doubt Greece is capable of sustaining a population of 6,000,000 to 8,000,000 of souls.

FINANCES OF THE KINGDOM.

The debt of Greece is about \$40,000,000. The expenses of the government average perhaps \$6,800,000 annually. Last year, for the first time within a decade, the revenues exceeded the expenditures, being some \$80,000 in excess. The revenues are derived, for the most part, from tariff duties, and from the old and objectionable system of one-tenth tax upon the products of the soil.

It is known by financiers that the old war debt of Greece, contracted in 1824-25, has not been recognized by the payment of either principal or interest. This debt, with interest, now amounts to some \$35,000,000. It was contracted amid the throes of revolution, and with the understanding that it was to be paid according to the terms of the bonds, by Greece, after the achievement of its independence. The nation was formed of about one-sixth part of old Greece, the remainder of the territory of the ancient nation — Thessaly, Macedonia, Crete, etc., and whose inhabitants fought bravely for independence — having been remanded back to Turkey by the protecting powers. Greece, as it is to-day, has offered to pay its due proportion of this debt; but up to the present time no terms have been agreed upon with the bondholders, who have contended that they were entitled to full payment, though, as is well known, they advanced originally only in the proportion of some sixty cents to the dollar. Now, however, negotiations are going on between the government and the authorized agent of the bondholders, with a fair prospect of a satisfactory settlement of this old debt, in which event Greek securities will have a place "on 'change" in the European capitals. At the present time, the government obtains all the money it requires from the banks of the kingdom at six and eight per cent interest, and Greek capitalists are always ready to extend to it every needed pecuniary assistance.

EDUCATIONAL.

Greece stands next to Germany in education enterprise. Attendance at the public schools embraces about three-fourths of the children between the ages of five and sixteen. The common schools are not all they should be, but they teach at least the rudiments of education. The schools are practically free; no charges are exacted for the tuition of poor children. Those who are able pay a very small

fee, which is accepted as a perquisite by the teacher. The University of Athens is entirely free, and the institution is in high repute. The attendance of students numbers 1,200 to 1,500, of whom about three-fourths are registered in the departments of law and medicine. The chief criticism to be made upon the university is, that it educates too many doctors and lawyers, in numbers far beyond the demand for service in these professions. As a consequence, many of them become politicians, seeking for official positions, and they constitute an element of mischief by contributing largely to influence frequent changes of the government, an evil that has worked very injuriously to the best interests of the kingdom. It is evident that a considerable charge should be imposed for tuition in the departments of law and medicine in the University at Athens, and the best minds in Greece are beginning to appreciate the fact and urge the adoption of that policy. The Arsakeon is a large and very popular institution for female education, with an attendance of about one thousand pupils. The Rev. Dr. J. H. Hill and Mrs. Hill established a school in Athens more than forty years ago. Mrs. Hill is entitled to the honor of having been the pioneer of female education in Greece. This school, with an average attendance of nearly five hundred pupils, is still maintained with efficiency, under the direction of Miss Muir, and there is a higher school at the doctor's parsonage, of which Miss Masson is the very capable principal. Miss Kyle has an excellent school of eighty to one hundred and twenty pupils. Mr. and Mrs. Sakellarios maintain an institution, admirably conducted, for the free teaching of poor children, with an attendance of about one hundred and thirty pupils, mostly Cretan children. All these schools, with the exception of the Arsakeon, are under American principalship and patronage, and have done and are doing much good by the free dissemination of education among the children (the larger proportion girls) of the poor. There are twenty-one literary, scientific and art corporations and societies in Greece, of which seven are for the advancement of general education; eight for the advancement of arts and sciences, and six for the mutual instruction of their members, by means of literary exercises, debates, etc.

ARCHÆOLOGICAL.

Excavations at Athens near the columns of Jupiter during the last season brought to light a large structure of Roman workmanship, supposed at first to have been the palace of the Emperor Hadrian; but after the *debris* was fully removed, it proved to be a large

bath or series of baths, probably for public use during the period of Roman supremacy. The different apartments cover a space of nearly two acres, and the main bath, with its fine flooring, solid walls and marble stairways, appears quite as perfect as any of the ancient baths at Rome. Antiquities, such as pieces of marble columns and broken statuary of various kinds, are frequently found in making excavations for buildings. It would seem from the vast quantity of this work which has been unearthed, and which excavations are constantly developing, much of it exhibiting great genius and skill in its conception and workmanship, that this department of art in which the ancient Greeks excelled, must have monopolized a large share of the industry and talent of the people. A letter from Athens states that "excavations at the king's country seat at Tatoi, some twelve miles from Athens, have brought out marbles with inscriptions leaving little doubt as to that spot being the situation of the ancient Decelia." On the island of Delos, M. Bournouf, the director of the French school at Athens, and some of the students of that institution, have made archæological discoveries of the greatest importance, having laid bare nearly the whole of an ancient temple, most probably the famous Temple of Apollo of Delos, and the ruins of a city. These excavations are to be continued. Archæologists, notably Dr. Schlieman, who resides at Athens, are of opinion that valuable and important treasures may be obtained by excavations at Mycenæ and Delphi.

BRIGANDAGE.

There is at present no brigandage in Greece. Not a single band of these outlaws has appeared in the kingdom during the past two years. The Turkish border is guarded by 4,000 Greek soldiers. The brigands all come from Turkey. They are generally Wallachians, with accessions to their ranks, now and then, of Greek fugitives from justice. It is possible for them to make raids into Greece through mountain passes and by unfrequented places along the extensive border, but they have found the enterprise to be unprofitable and often disastrous, and latterly they have given it up entirely. Public opinion condemns them. In making a journey last May through that portion of continental Greece that was formerly scourged by brigandage, I had occasion to note the general expression of reprobation of this curse on the part of the people of all classes. Persons suspected of connection with the outlaws, or as friendly to any of them, would not be tolerated at all in these communities. The government, too, exercises the most laudable vigilance to suppress the evil. From a somewhat extensive observation of the country,

with opportunities to gather official and other evidence on this subject, and so arrive at the truth, I undertake to say that as good order prevails and safety is as fully assured in every section of Greece as in any other country of Europe at the present time. In reference to brigandage, it may be said it has heretofore prevailed in northern Greece only; it has never existed in other parts of the kingdom, embracing more than two-thirds of its territory. During the past two years between thirty and forty brigand malefactors, captured near the Turkish border, have been executed by the guillotine. Tarkos, chief of the band that murdered the English party on the Marathon road in 1870, was captured and shot on the Turkish side of the border during the last autumn. Spanos, another chief, who had for years levied contributions upon the people in northern Greece, at last found the country too hot for him and disappeared. His band is the last one that has passed over the border into Greece; and on the occasion of this visitation he was overtaken by the Greek military, some members of his party were captured and subsequently executed, while he barely escaped, wounded, it is supposed, into Turkish territory. The good understanding now existing between Turkey and Greece has secured the hearty co-operation of the two powers to extirpate the evil throughout that section.

REGARD FOR AMERICANS.

The Greeks are ardent admirers of America and Americans. On the occasion of my introduction to the late Archbishop Theophilus, the head of the Greek church in the kingdom, who was a soldier in the revolution and received severe wounds in battle from which he never recovered, he greeted me most heartily. He said the United States was the best friend Greece ever had; the generous contributions of the American people during the revolution, he remarked, saved multitudes of men, women and children from starvation; and, he exclaimed with much emphasis, the tears streaming down his cheeks, "The Almighty Father knows how our hearts were then filled with gratitude for your great American people, and how, ever since, we have invoked His blessings upon them — prayers that have been answered in the wonderful growth and prosperity of the model republic of the world." Then, in response to my remark that we in America were now, as of old, the sincere well-wishers of Greece, he said, "Yes, we know that to be true. Other nations," he continued, "that pretend to protect Greece, and profess to do so in the interest of Christian civilization against the ideas of tyrannical Turkey, do not

show themselves to be such friends of ours. *They flaunt the cross from their foreheads, but cherish the crescent in their hearts.*" Visiting the country and mingling with the people, you will be told by every new acquaintance, young and old, how much Greece is indebted to the people of the United States for sending them shiploads of provisions and clothing during their days of poverty and darkness in the revolution, and that this contribution of material aid at a critical period saved thousands of lives, if it did not save their cause and give to them national independence. An American is sure to meet with the most generous hospitality in every section of the kingdom.

CHARACTER OF THE GREEKS — POLITICS AND BUSINESS.

What of the Greeks of to-day? They certainly retain many of the characteristics of their renowned ancestry. Curiosity with them seems to be almost as active as in the days of St. Paul, who said of the Athenians that they "spent their time in nothing else but to hear or to tell some new thing." It requires no newspapers to spread the news among the Greeks. They are great talkers, and many of them delight in the vocation of the gossip. Some draw upon imagination for their facts, and entertain with curious stories of their own invention. Many delight to babble politics, and the *café* discussions are quite as exciting and acrimonious as the partisan agitations of a presidential campaign in our country. There are too much politics and too many professional politicians in the country. Parties are divided, not upon questions of principle, but by preferences in respect of leadership; so it often happens there are half a dozen parties, each known by the name of its leader, as the Commondourous party, the Ziamis party, the Bulgaris party, or the Deligeorges party. This evil of parties and leadership grew to become so intolerable and threatening that it was once humorously suggested to his majesty, the King, that all the leaders and would-be leaders, some five hundred in number, should be assembled together, put upon shipboard, and sent to America for the period of five years, with the injunction to study well our institutions, in the hope they would learn enough of good citizenship and political economy to qualify them upon their return to become valuable citizens and servants of the State. But I am not quite sure after all that the lessons they would receive here, as matters are going with us now-a-days, would prove altogether beneficial to them. The struggle is for place and power and official patronage. The outs, of course, are the most numerous, and as the University turns out a great many learned

idlers, known as lawyers and doctors — idlers because they cannot obtain business in their professions — a violent agitation is going on a good share of the time to secure a change of the ministry, with the view of obtaining for themselves subordinate positions in the departments. And so through this influence, until recently, ministries have been overthrown as often as three or four times a year, and it was impossible to have that steadiness of government requisite to the enforcement of policies for the development and improvement of the country. Now, however, administrations are maintained for a longer period, and are enabled to accomplish something for internal improvement and the development of the resources of the kingdom.

Thus, at last started in the right direction, and with important works already begun, there is a promise of certain progress in the future. Besides, a considerable number of Greeks who had acquired large wealth in other countries, have returned to their native land, and are devoting their capital and their efforts to secure greater achievements than have heretofore been realized in the material progress of the little kingdom. The Greek loves his country. Residing in other quarters of the globe and thousands of miles away, the aspirations of his heart are that he may one day be able to return and contribute to the advancement of the interests and the glory of his beloved Greece. The Greeks abroad have contributed millions of dollars for the rebuilding of Athens, and for the erection of modern monuments that may in some degree reflect the ancient glory of the classic land. Such love of country and of home is certainly the manifestation of noble patriotism, and it promises what has already been partially realized, namely, a "living Greece once more." But speaking of the Greeks as a people in a critical sense, I may say intense individuality is one of their greatest failings,— every man for himself, each one seeking to be ahead, lack of faith in each other. Hence the difficulty of co-operation for organized effort. A great many attempts have been made to secure organizations of different kinds, with the view of accomplishing objects for the common good, and upon this rock most of them have been broken to pieces. All could not be at the head, and very few were willing to act as subordinates, and so failure has been the result of the competition for leadership in business, as also in political service. This weakness, for I can call it nothing else, was the great evil of ancient Greece as it is of Greece to-day. It brought ruin upon the country of old; it has retarded its progress in these modern days. But schooled and disciplined abroad, and acquiring business strength and wealth withal, prominent Greeks have recently settled in Athens, have

overcome this impediment to success and secured efficient organizations, as in the case of the Laurium Mine Company, the Athens and Lamia Railway Company, the large banking associations at the capital and other important enterprises, for the improvement of the country and the development of its resources. The Greeks are a proud people; from high to low they walk with stately tread and dignified carriage, as if conscious of the glory of their ancestry, and proud that, even though subjected to hardships and poverty, they are still citizens of the country of Demosthenes, of Socrates and Pericles. They will almost deny themselves the necessities of life in order to present a fine external appearance in the way of dress to set off and adorn their majestic bearing. But they are a cordial, friendly people. If quick to discern faults, they are equally prompt to appreciate virtues. Though the evil observable among the Latin races, and manifest very largely throughout the East—that of a want of truthfulness—appears in a modified degree among the Greeks, still instances are not few wherein most truthful devotion is exhibited by them in their friendships, and an integrity that never yields to temptation or bribery is illustrated in their public and private life in a manner reflecting the highest nobility of character. The Greeks of Greece in this respect, and in all other characteristics of true manhood, are far superior to the representatives of that race residing in large numbers in many of the commercial towns of the Levant and throughout the East. It is there they have been debased by contact with the Turks, and by those antagonisms which come from a war of races. The truest type of Greeks and those of purest blood are to be found in the provinces, especially in the Parnassus region. There are no public inns in the villages, but strangers are most welcome guests of citizens, who vie with each other in efforts to give good cheer to the weary traveler. The social customs and habits of these people are quite primitive; some of the practices that prevailed in pre-historic times, as described by Homer, are still in vogue. Their costumes are varied, and some of them very picturesque. Loose sleeves, the open and gold-embroidered jacket, the flowing fustinella, worn by gentlemen, are very pretty; the intermixture of bright colors and scarlet trimmings of ladies' dresses well become the forms of the graceful brunettes of the Parnassus. In Athens the Frank dress is most worn. There are many Albanians, chiefly peasants, residing in Attica, and the shepherds are composed largely of this class. They speak Greek very indifferently or not at all; the women, who rarely come to town, as a rule converse only in the Albanian vernacular.

The family relationship in Greece is maintained in great purity, instances of deviation from propriety being very rare indeed. Where such impropriety occurs disgrace is attached to the whole family, and is even carried down to the succeeding generation, so that the integrity of the household is guarded even with more care than is exercised for the protection of life itself. In this respect Greece stands out conspicuously and honorably in contrast with other nations in Europe.

POPULAR LIBERTY — NATIONAL CHARACTERISTICS.

The Greeks are a freedom-loving people. They are jealous of their political rights. Any government measure that bears the appearance of encroachment upon popular liberty is opposed with almost furious resistance. Their form of government is a constitutional monarchy, but is even more republican in its practical working than that of Great Britain or Belgium. Free suffrage prevails, and the deputies constituting the single legislative body of the kingdom, are elected by the people. The ministry, or as we call it here, the cabinet, is the government for the time being, under the constitution and the laws, and no ministry can survive the opposition of a majority of the chamber of deputies. The king's power is practically restricted to proroguing or dissolving the chamber as circumstances may render desirable. He names a new ministry as the majority of the chamber manifests its wish. As long as the ministry commands this majority, he sustains it. The Greek church is inwrought with the very existence of the state, and is in fact a part of it. The Greeks adhere to their church and its traditions as the sheet-anchor of their national and religious safety. Bound up with it, too, are their highest hopes and aspirations for the Hellenic race. There is always a state of popular unrest in the kingdom; political agitation, often very violent, is going on constantly. There is freedom of speech and the press, and that freedom is availed of by heated discussions and agitations in behalf of what they characterize "political ameliorations."

Procrastination is one great fault of the people, both in governmental and business activities. Every thing is put off to a more convenient season, often exhausting all patience by the disposition to postpone and delay. This, however, is characteristic of all the people of the East, and is one cause which retards the march of enterprise and improvement. The Greeks, especially the ministry, are considerate enough, and debate all propositions, whether important or not, with great prolixity. Action once commenced there is an

other season of delay, and so every thing moves too slowly. The Greeks who have recently come to the country from other capitals are exerting a strong influence to change this method of conducting business, and to inaugurate prompt and vigorous movements toward the accomplishment of results calculated to advance the interests of the kingdom.

SOCIAL SITUATION.

What of the social situation in Athens? It is quite as advanced in the refinements and elegancies of life, as in any other European capital. French is the recognized society language. An American gentleman, in attendance at a fashionable reception, remarked, "Why, all this appears even more Parisian than Paris itself." Paradoxical as it may appear, the remark is true of the court and diplomatic society in this sense: It embraces fewer persons who speak the English language, more who speak only French on the occasion of balls, receptions, etc., than similar society at the French capital. Very many of the middle classes speak French. Many of the shopkeepers speak French and Italian, and a few English and German besides. Of course the native tongue, modern Greek, is the language most in use outside of fashionable circles. The fashionable season begins about the 1st of November, and continues three to four months. It is characterized by quite as much gaiety as the most fervent devotee of pleasure and fashion could desire.

During the hot season, the court, foreign ministers, and well-to-do people generally, are absent from Athens. They usually leave town about the middle of June, and remain away until October. Some go to the islands and the mountain regions where they own estates, others to the Bosphorus, many to Switzerland and other parts of Europe. The court is established at Corfu some two months of the hot season. At its beginning in June, the royal family retire to their country residence (Tatoi), two or three hours' drive from Athens. The diplomatic corps is generally quite fully represented at Corfu during the sojourn of the court there.

ANCIENT LANDMARKS.

Many Americans visit Athens on the way to or returning from the East. Their universal expression is that of satisfaction with their observations and experiences at this capital. There is but one Parthenon and one Temple of Theseus. These, with other specimens (some of them almost intact) of the unrivaled architecture of the ancient Greeks, dating back to periods hundreds of years before

Christ, and having a well-defined history, too, are not only remarkable, but in and of themselves, as well as in their associations, most sublime. A day's journey from Athens, nearly all the way by steamer, enables the tourist to visit the Cyclopean Walls at Tyrins, and the Great Tomb of Agamemnon, and the celebrated lions, cut in stone, at Mycenæ — all constructed twelve and fourteen hundred years before Christ. With more time, and the disposition to make the tour of the country, the journey may be continued across the Corinthian gulf to Itea, on the continent; to Crissa, with charming views of mountain and plain; to Delphi, under the shadows of the Parnassus, whence the oracle in ancient times sent forth pronouncements for the government of mankind, and where bubbles forth the same fountain of which it was written, "Drink deep or taste not the Pyerian spring;" up the classic mountain to the cave of the Nymphs; thence to Arachova, a spur of the Parnassus, with most romantic surroundings; thence to Chæronea, the birthplace of Plutarch, and where may still be seen the tombstone erected to his memory, as well as the most interesting sepulchral monument in Greece, perhaps in Europe, namely, the immense lion cut in stone, excavated a few years since, which the Greeks erected as a memorial to their heroes fallen in the disastrous battle with Philip of Macedon; thence to Lebadea, the enterprising cotton mart of Greece, historical also for its fountain and sanctuary, and classic grove of the muses; thence to Thebes, facing the famous hill of the Sphinx, and vieing with Athens in ancient splendor and renown, and of which it is said the brooks that flow at the foot of the hill on which it is built, were great in history and poetry when the rivers of Europe and America were unknown; thence to Plataea, with its prehistoric Acropolis, and upon whose plain was fought the great and decisive battle between the Athenians and Persians, wherein the final blow was administered to the eastern invader, and Greek soil forever relieved of his hated presence; thence to Eleusis, with the ruins of its celebrated temple of Ceres, wherein were wrought the curious mysteries described in the classics; thence to Athens, the starting point of the journey, — the tour by easy stages and without hurry, being accomplished within a period of ten days. And thus of mountain and plain, and ancient monuments, and classic rivers, and ground of apostolic labors, and famous battle-fields, and wonderful views of scenery, probably unsurpassed in the world, will be seen more that is instructive and interesting, and even marvelous, than can elsewhere be observed the world over, within the same period of time.

CLIMATE AS AFFECTED BY FORESTS.

In respect to climate in Greece, this fact is observable, and demonstrates the utility of forests for the maintenance of an equilibrium of moisture through the different seasons of the year. At Athens and throughout Attica, where hundreds of years ago the country was denuded of its forests, and where the mountains had been laid bare to the very rock from the abrasion of the elements, and the earth washed down into the valleys, almost obliterating the courses of the ancient rivers, the drouth of the hot season is continuous for a period of from four to five months, with scarcely a drop of rain to refresh the parched earth. But in other sections of Greece, as in portions of the Peloponnesus, the island of Eubœa, and elsewhere within seventy-five and one hundred miles of the capital, localities where forests have been preserved and are still carefully protected, no such drouth afflicts the land. The rain is distributed throughout the different seasons of the year, so that the moisture of the earth is retained, and its fertility preserved. Here is an important fact that requires no chemical analysis, or learned scientific dissertation to enforce and illustrate its meaning.

What is true of Greece in this matter is, I understand, true of the entire East. Drouth and desolation follow the removal of the forests; where they are maintained, the rainfall comes in proper seasons, the soil is fertile, and yields abundantly to supply the necessities of man. May not our own people, who seem to be possessed of a passion to practice the butchery of the forests, gather a lesson here for their own good, and the welfare of future generations?

A BEAUTIFUL SERVICE.

The religious service of the Greek church at the close of Lent, and the ushering in of Easter, is novel and impressive as witnessed at the cathedral in Athens. At night many thousands of people, men, women and children, assemble in and around the cathedral. A large platform erected from the steps outside, is carpeted and adorned with sacred emblems. The metropolitan, the head of the Greek church of the kingdom, and his associate bishops, with other ecclesiastical officials, the king and queen, and high officers of state, together with members of the diplomatic corps, occupy seats upon this platform. After reading from a large bible, the metropolitan presents a lighted candle to the king and queen, who bow low and kiss his hand. As the lights are presented — it is just midnight, and the bells are striking the hour, — the metropolitan proclaims in a

loud and clear tone of voice, "CHRIST IS RISEN!" The people with one acclaim respond: "HE IS INDEED!" Immediately cannons boom, rockets shoot high in the air, bells peal joyously, blue and green roman candles are fired from surrounding balconies, and brilliant lights of variegated colors gleam from the high walls of the Acropolis, looking like blazing stars let down from heaven and suspended mid-way to earth. At the same time the great mass of people light the dark night with thousands of flickering candles, until the spectacle seems like a fairy dream. All night long, and all day Sunday, cannons boom, bells are rung, pistols and guns are called into service, children discharge fire-crackers, and there are demonstrations of general rejoicing. The Easter *fete* continues for three days, and during this period friends meeting on the street and elsewhere, exchange a new salutation for the customary "good morning." One exclaims, "Christ is risen!" and the other responds, "He is indeed!" The gentlemen embrace, kiss each other, and pass on. Just so persons who have been estranged from each other, meet and exchange the Easter salutation. This is made the occasion for reconciling enmities, asking and receiving forgiveness, making and strengthening friendships. The custom is almost universal. Is not this spirit of love beautiful, and does it not enforce the proclamation of our Saviour, "Peace on earth; good will toward men?"

The Greeks have too many *fete* days, some forty I believe during the year, when business and industrial operations are generally suspended. This involves a vast loss in labor production, and, therefore, an immense loss to the country, of gains that can only be wrought out by industry. Then there are the various days celebrated on the anniversary of the sage, hero or saint for whom a person is named; as, for example, on such occasions, the friends of the Georges call upon the latter on St. George's day, the Thomases on St. Thomas' day, and all expect to have a jolly time of it. This practice also largely diverts from productive industry. I have been informed that the festival observances have been restricted to one-half the number of days that were formerly given up to these indulgences; but the number might still be diminished one-half, and yet afford a good share of a month in the year for holiday enjoyments. The Greek working people, however, have not yet availed themselves of the privileges of trade unions; a day's work with them, when they labor at all, is a steady service of at least twelve hours. This makes up somewhat for lost holiday time. The Greeks are a temperate people; they drink the light wines of the country freely, but very seldom to the excess of intoxication. Alcoholic stimulants, such as

brandy, gin, whisky, and the so-called "Jersey-lightning," and other adulterated abominations, are scarcely used at all by them as a beverage. Therefore, they escape in a large degree the curse of too many of our people, the greatest curse I may say that afflicts our working classes. Mendicancy is not common in Greece; beggars are few. Appeals for help are usually made by means of subscription papers. Your genuine Greek is too proud to beg; he will suffer much and fast long before he will even start a subscription paper. There is much poverty in some sections of the country, but the Government does something to relieve it, and generous nature more by providing fruits and vegetables in great abundance, much of spontaneous growth at all seasons of the year, with ethereal mildness prevailing even during the period of the severest rigors of our winter season. So the most shiftless can obtain sufficient sustenance to meet the absolute necessities of life, unless disabled by accident or disease; and in that event they are maintained by public charity. Mendicancy is not a great evil in Greece as in some other and richer countries of Europe. The self-respect cherished by the Greeks, and pride of race if not of family, go far to exempt them from this evil. Women are not made drudges of and worked like cattle, as in some other countries of Europe. The peasant women perform out-of-door labor more or less, it is true; but the lightest tasks are imposed upon them; the coarser and heavier work is performed by the males. And, when it is possible to spare the women from service outside the household, they are relieved from it entirely. But when so relieved — I speak of the working classes of the provinces — they are busy with their work in-doors, plying the distaff or the loom, or contributing otherwise to industrial production. They are all workers in some way. The Greeks are a mercurial people, exuberant in their enjoyments, fiery in temper, impetuous in speech, sympathetic in temperament, tender in feeling, often impulsive in action; they are keen at a bargain and have a genius for the diplomacy of trade; they are gifted in speech, are astute in argument, and fond of discussion; they hate with bitterness and love with intensity. Treating with friends they are frank and deferential; dealing with strangers they are cunning and cautious; meeting enemies, shrewdness of artifice is brought to bear to circumvent, or vehemence of warfare introduced to overwhelm their adversaries. They are proud but not boastful, given to controversy but not quarrelsome. Strong in faith, they religiously cherish the idea of a grand and re-united and powerful Greece to come, that shall truly reflect the best ideas and achievements of the glorious Greece of the past. Who shall say that such

a people may not attain to most creditable results in nationality, and contribute largely to the development and advancement of the highest and noblest civilization?

THE COURT OF GREECE.

King George possesses a quick, bright mind. He is pleasing in address, easy in manners and genial in disposition. He is earnest in purpose, firm in character. I fully believe it is his sincere aim to do all that his responsible position will admit of under the constitution to assure a wholesome and liberal government to his kingdom. And he manifests a most commendable interest in affairs, zealously favoring such measures as he is persuaded will contribute to the welfare of his subjects. He is not vain or frivolous and given to pleasures, as has been falsely reported of him. He is sober-minded and intelligent, and often exhibits great keenness of perception and strong, good sense in the analyzation of men and measures, and in the solution of difficult problems of state. He is still young in years, and those whose intercourse with him has been intimate say that his advancement in the knowledge of statesmanship has been marked as it has been creditable, while in practical executive ability he is ready, prompt and effective. He is frank and outspoken, truthful and persistent, anxious to do his duty well but resorting to no clap-trap artifices to win popular favor. Queen Olga is beautiful in person as she is lovely in character. She illustrates in all her ways the sweetness of simplicity, and the gentle qualities that adorn and ennoble true womanhood. She is thoroughly accomplished, yet there is entire absence of vain pretension or foolish pride in her demeanor. She receives with a grace that is charming because it is natural and all her own. She dispenses charities with a most liberal hand. Fer- vently devoted to her husband, loving her children with the deep affection a true mother bears her offspring, kind to all she meets; wishing only good to the people of every class and condition, and bestowing generous benefactions upon the deserving poor, Queen Olga is beloved by all in Greece, and the people, from highest to low est walks in life, speak only praises of their charming Queen. Of the court as an organization, it may be said that it is attractive as it is brilliant in its social characteristics, and the hearty welcome and perfect ease of its administration and the grace of its hospitalities have earned for it a deservedly excellent reputation throughout Europe.

WHAT IS TO BE SEEN.

There is life in the little kingdom, and much of generous life, too, with rivalries and high debate and dinning activities, that remind one of Greece in the days of its ancient renown. There, too, may be seen those classic monuments that still give evidence of the life that infused itself into our organization. The Propylæa, the Parthenon, the Erechtheum, the Hall of the Caryatides, the Temple of Victory, the Theater of Dionysius, the Temple of Theseus, the Pnyx with the bema of Demosthenes, the Panathenaic Stadium, the Temple of the Winds, the colossal columns of Jupiter — these immortal works of the classic masters impart to-day a living inspiration. Then, from the Acropolis at Athens, whence we take our observations of these grand old objects, some of them now almost intact after enduring the abrasions of more than two thousand two hundred years, there is the cheerful picture of the modern city below, with its fifty thousand inhabitants; there, too, and very near is the Areopagus or Mars Hill, with steps cut into the rock leading to the bema, upon which St. Paul stood when he preached his remarkable sermon to the men of Athens; not far distant Pentelicus rears its head in mountain grandeur, and from an accessible position thereon one has distinct views of Marathon and its famous battle-field. And nearer still, rising up clear-cut and as distinct in outline as if within the distance of a mile, is sublime old Hymettus, redolent of the classic honey, fit nectar for the gods; nearer still is graceful Lycabettus, standing out like a giant sentinel overlooking the capital, while the Parnes completes the chain to the westward. And now we look out upon the waters of the Ægean sea, dotted with many islands. We have right before us the bay of Phalarum, upon the banks of which Demosthenes disciplined himself in oratory, subjecting his palate to a patient treatment of pebbles so as to overcome a natural impediment of speech; to the right is the bay of Salamis, where the great naval battle was fought between the Greeks and Persians, the victory of the Hellenes, almost miraculous as it was, preserving the elements of that civilization that has given light and knowledge to the world. And now with vision extending beyond Sunium, we see quite distinctly the Acropolis at old Corinth, more than forty miles in a straight line. Wonderful views are these, presenting objects that seem to be almost instinct with life, as we contemplate their marvelous history. Grand old country! there is life in the very atmosphere that envelops the memorials of her glorious past; there is inspiration for scholarship, and quickened life for civilization in their study and contemplation.

CONCLUSION.

Winter is the best season for visiting Athens, but the weather is delightful also in March and April, and up to the middle of May. The winters in Greece, especially in Attica, are charming. Such cerulean skies, wonderful sunsets, and clearness and purity of atmosphere, I have nowhere else seen and experienced. I know of no more attractive country for residence and study, none more inviting for the tourist and scholar, during eight months of the year, commencing with October, than this sublime old country. At the capital, one has all the advantages and enjoyments of European civilization. Greece is literally a land of flowers. Their sweet fragrance prevails throughout the year; the gardens are always bright and beautiful. Everywhere charming views of mountain and plain are presented.

Of the Greeks of to-day it may be said that they are struggling under difficulties for the maintenance of nationality, and the promotion and development of the old leaven of Hellenic nobility. They have many and manifest faults, not unlike those of their heroic ancestors; but they have many virtues, too, with high pride of character, natural love of freedom, and unbounded gratitude for American friendship in the past, and for our good wishes in behalf of their welfare in the future. They have natural resources which, if properly developed, will make their little kingdom prosperous and wealthy. Let us trust that their energies and enthusiasm, their quickened life and earnest endeavor, may be directed to the end of successful achievements, for the honor and glory of this land of sunshine and flowers, of classic mountains and monuments, and of a grand and consecrated history,

"Till better days
Dawn in those yet remembered rays
Which shone upon the Persian flying,
And saw the Spartan smile in dying."

V.

MEMORIAL MEETING.

Memorial meeting of the American Geographical Society, held at the Academy of Music, New York, Thursday evening, April 23d, 1874; Chief-Justice DALY in the chair.

Notwithstanding the heaviest rainstorm of the season, more than twenty-five hundred Fellows and guests of the Society participated in the proceedings. By the courtesy of Major General W. S. Hancock, U. S. A., the United States Army Band, stationed on Governor's Island, played dirges at intervals during the evening.

INTRODUCTORY REMARKS BY CHIEF-JUSTICE DALY.

FELLOWS OF THE SOCIETY, LADIES AND GENTLEMEN:—The connection of Dr. Livingstone with the Society extends almost to the period when he commenced his career as an explorer. His name has been the longest upon our list of honorary members. Many years ago, we honored ourselves by placing his name on that limited list, and he expressed himself honored that we had done so. We had hoped that when the work to which he had devoted so many years of his life had been accomplished,—the tracing out of the great network of rivers and lakes which constitute the water-sheds of South and Central Africa—that he would have visited this country, and that we would have had the opportunity, upon some public occasion, of expressing to him our appreciation and that of the American people of what he had done in extending the boundaries of human knowledge, and in the great cause of humanity. It was destined that it should be otherwise. He is now in his grave, entombed with the illustrious dead of England, and all that is left us is to unite in the public tribute of respect to his memory. You will be addressed by four eminent gentlemen, members of the Society, upon his life scenes and character. Preparatory to their remarks, I will call upon Major Dane, who is himself about to commence his career as a geographical traveler in the exploration of the unknown regions of Cen-

tral Asia, to point out the respective routes of Dr. Livingstone, upon the map of Africa, that you may have before you a large portion of that great continent that has been opened by his explorations and discoveries. I should also mention that the portrait of Dr. Livingstone which surmounts the map of Africa has been painted for the occasion by a Fellow, the distinguished artist, Mr. Reinhardt.

MAJOR H. C. DANE ON THE GEOGRAPHICAL WORK OF DR. LIVINGSTONE.

MR. PRESIDENT, FELLOWS OF THE AMERICAN GEOGRAPHICAL SOCIETY, LADIES AND GENTLEMEN:—I deem myself most highly honored in being invited by the officers of the Society to point out upon the map, a general outline of the several extensive journeys of exploration made by the remarkable man whose memory we honor this night. Time will necessarily compel me to be brief and explicit; nevertheless, I shall endeavor to give you such an understanding of the vast work he accomplished, that you may be able to follow him in his wanderings, as those who are to address you upon his character and achievements shall recount his labors. Thirty-five years ago, all we knew of the great continent of Africa, was its northern states bordering upon the Mediterranean; the line of its western coast, as it was given to the world by Prince Henry, the navigator, whose soul was inspired to discovery by the wonderful exploits of Marco Polo, through the efforts of his naval commander, Vasco De Gama, who coasted down to the Cape of Good Hope, and pushed across the Indian ocean.

On our geographical maps of twenty years since, little more was seen, except a few towns along the eastern coast, while all the vast interior was an almost unspotted blank, with its inscription in bold type — "THE UNEXPLORED REGION OF ETHIOPIA." The Nile was seen as a line running up through Egypt, with its sources lost in the vast unexplored region, and the dim romance of the histories of Ptolemy and Herodotus.

But it is a singular fact that, notwithstanding our blank modern maps, we find in a map published by Ortelius, in 1573, a copy of which may be seen in the marvelous collection of the Geographical Society, two large lakes in the midst of the portion that afterward became a blank. The larger one bore two names; its northern limb that of Zaire, and its southern limb that of Zembre; the lesser was called Zaflan. And both lakes are represented as being the chief sources of the Nile.

In 1840, David Livingstone arrived at Cape Town, to enter upon his work as a missionary. Very soon he proceeded northward, to

the town of Kuruman, where he joined Dr. Moffatt, and began his labors. There he met and married the daughter of Dr. Moffatt, and shortly afterward advanced to Kolobeng, and established his mission. In 1843, he labored in Mobatza, and in 1845, in Chuanane. Up to 1847, he continued his labors in that vicinity, making various journeys into the surrounding country, among the Boer tribes, a savage and treacherous people, who were incapable of improvement. While he was away from Kolobeng, in 1847, among the neighboring tribes, the heartless Boers made a descent upon his mission, and utterly destroyed it, burning his house and stealing all his property, and murdering hundreds of the people. Upon his return, he found himself almost a beggar, and surrounded by an openly hostile people. Most men would have been crushed by such a blow; but with Dr. Livingstone it served only as an incentive to still greater effort. Gazing upon the smouldering embers of his house, and then upon his defenseless wife and children, he made his resolve, and at once set about its execution. He hastened to Cape Town with his family, his noble soul animated by a purpose that thrills us with admiration as we recall it. He saw the immense difficulties before him, and realized that he must henceforth be shackled with no domestic burdens, and nerved himself to tear from his heart the tenderest chords of his nature. He secured a passage for his family to England, and with emotions we cannot know, bade them God-speed, and smothered his feelings in deep and diligent study of the sciences under the Royal Astronomer. Back to Kuruman, back to Kolobeng he went, turning his back upon all he loved, and went to his scientific work on the arid sands of the Kalahari desert, in 1849, and was soon rewarded in the discovery of Lake Ngami. From there he crossed the Tioghe river, and on to Schellu's Town, where he won the chief to his support. He next discovered Lake Kalai, and then pushed on to Sesheke, in 1851, where he won the confidence of another chief. From Sesheke he started for the west coast, passing up the Leeba river, stopping at Barotze and Shinte, beyond which he discovered Lake Dilolo. Leaving Lake Dilolo, the bold-hearted wanderer encountered the most trying journey he ever made. It was on that journey he waded miles through the swamp, in the water up to his neck, seeking for a ford. At last he succeeded, and forced his way on to Njambi, and Cas-sange, thence down the Conanza river, reaching St. Paul de Loando in 1854. After a rest of a few weeks to recover his wasted strength and health, he turned back with the sublime purpose of crossing the continent to the east coast. On his way to Sesheke, he visited

Cabango in 1855. Leaving Sesheke, he discovered Garden island, one of the most charming spots in the world, for whose marvelous beauty he called it the Garden. He next discovered a wonderful waterfall, twice the height of Niagara, to which he gave the name of Victoria. Forcing his way through appalling obstacles, he reached the Zambezi river, and then down that to Zumbo, then on to Tette and Sena, finally reaching Quilimane, in 1856. From there he sailed for England, after an absence of over sixteen years, having traveled in the unbroken wilds of the unknown land, over nine thousand miles.

In 1858 he returned to the east coast to enter upon his second journey. Passing up the Kongone river, the south mouth of the Zambeze, to Sena, he completed his equipment and left for Tette, which he reached in September. From there he crossed to Chibisa, and making that his base, made several journeys, the first resulting in the discovery of Lake Shirwa, the second to Lake Nyassa and along its western shore, then back to Tette. In May, 1860, he started from Tette for his second visit to the Makololo country. He reached the Chicova plains June 1st, where he encountered great difficulties. He reached Zumbo on the Loangwa river, June 26th, and Victoria falls, August 9th. After making further explorations in that neighborhood, he passed on to Sesheke to visit his old friend Sekeletu. Returning and taking a new route from Victoria falls, he reached Sinemane October 5th, and Zumbo November 1st, and Tette on the 23d. He journeyed slowly down to the Kongone river, reaching his starting place January 4, 1861. After a short rest, he made a second journey up to Lake Nyassa. Upon his return to Shupanga, he was doomed to a sad experience in the death of his devoted and beloved wife. The terrible exposures to which she had been subjected had sapped her life, and on the evening of a soft and lovely Sunday, April 27, 1862, she left him in the midst of his vast explorations and passed to her rest. However sad his heart may have been, he silently turned his face inland once more and buried his grief in the deep shades of the unbroken forests, and made several journeys. Having conceived the idea that Lake Nyassa might be reached by way of the Rovuma river, he sailed for that river, August 6, 1862, reaching it the first of September. He at once began its ascent, and progressed until the 25th, when he reached cataracts at Nyamatolo which impeded his further progress, and he returned. Soon after he received orders to return to England, and sailed May 19, 1863, having traveled several thousand miles in addition to his former journeys.

In 1866 he reached Zanzibar for his third journey. On the 28th of March he left Zanzibar for Mikindany bay, and began the second ascent of Rovuma river. Reaching Nyamatolo, he left his boats and went overland, passing south of Lake Nyassa, and taking an inland route among the mountains, passed northward through the Lobisa country, the home of the Babisa tribes, who were largely engaged in the slave trade. Crossing the valley of the Lowangwa, he passed along the northern shore of Lake Liembi, which he thus discovered to be separate from Lake Tanganyika. Thence southward again into the Lobisa country, he changed his course to the north-west to Lake Moero, then southward to Lake Bangweolo or Bemba, which he reached in 1868. Exploring that lake and vicinity quite extensively, he went back to Lake Moero, passing along the east coast, then back to Cazembes, and from there went to Lake Tanganyika and explored its western course up to Uguhha. He crossed to Ujiji in May, 1869, and rested for a short time. He crossed again to Uguhha, and started on a far western tour, reaching Bambarre in July. Making that a base, he explored Lake Kamalondo to the south, and then the unbroken regions to the north, where he discovered many large rivers. In August, 1870, he left Bambarre for the farther west, visiting Bakoos and Bagenya on the Lualaba river, and discovered a large lake, to which he gave the name of Lincoln, in honor of our most illustrious and honored citizen and ex-president.

From Bagenya, in 1871, he made his way into the wild regions to the east, where he found a primeval forest with large villages about ten miles apart. He returned to Bambarre and began his journey back to Ujiji, where he arrived in October, 1871, thoroughly exhausted and out of funds. Disappointed and sad, he set himself to writing up his journal and otherwise busying himself to keep away despair. And while thus engaged, and waiting for — he knew not what — to his astonishment and amazement, the intrepid Stanley, the well-supplied messenger from the New York *Herald*, presented himself before the well-worn traveler with all his heart most desired. Mr. Stanley has given the world the account of the travels of the two together, and of that I need not speak.

At Unyanyembe, Stanley and Dr. Livingstone parted early in 1872, while Sir Samuel White Baker was fighting the Bari in the great basin of the Nile, and Alvan S. Southworth, another representative of the New York *Herald*, and now the active and enterprising Secretary of this honorable Society, was pushing his way at the head of an expedition up that mysterious river five hundred miles

above Khartoum, the junction of the Blue and White Niles. Soon after Stanley left him, Dr. Livingstone started on his last journey. Well worn and exhausted, the bold old pioneer started once more alone, with his black comrades, for the wild interior. His plan was to pass to the south of Lake Tanganyika, to the south shore of Lake Bemba, then northward to the west of the Conda Irugo mountains to Lake Kamolondo, and from there to Lake Lincoln, and thence to the large lake at the north, which has never been visited.

He had passed to the south shore of Lake Bemba, when he found that his strength was failing, and that he could not proceed. The unequaled trials, privations and exposures through which he had passed during thirty years of toil, such as no other man ever experienced, together with the malaria of the jungle, had thoroughly sapped his constitution, and with a sad heart — sadder than we know — he realized it. No one will ever dare to picture the disappointment he must have experienced as he gave up the last hope of his life. Weak and helpless he crossed the lake to the north shore and started for Unyanyembe, longing for home. But the attempt was in vain. He had delayed too long. He could continue his journey but a few days on his mules, and then abandoned them for a litter which his faithful attendants bore through the tangled forests for three days, when he was compelled to halt. Then it was that the longing of his weary soul for his home and loved ones found utterance. He longed for the comforts of civilization. For thirty long, tedious years — and what years to him! — the damp and poisonous soil of Africa had been his couch and the starry vault of heaven his canopy, and he had always been satisfied; but now when the long march was drawing to a close he yearned for other shelter, and in his agony he cried: "Build me a hut to die in." The hut was built, rough and simple, and they laid his sinking form therein.

From the deep, dark, cold valley, into which he was slowly but surely slipping, came a chilling wave that swept over his broken frame, and pressed out the bitter cry: "I am very cold; put more grass upon the hut." But neither more grass upon the hut, nor the kind attentions of his one devoted and faithful attendant could warm his blood. And there, alone, deep in the thick forest shades of the land where he had fought so long and nobly, a few miles from the beautiful shores of Lake Bemba, his long march was ended. There he pitched the tent; there he stacked his arms, and went to his rest: —

"Sustained and soothed

By an unflinching trust, * * * * *
Like one who wraps the drapery of his couch
About him, and lies down to pleasant dreams."

ADDRESS OF THE REV. WILLIAM ADAMS, D. D.

The Rev. Dr. ADAMS said :

MR. PRESIDENT : — The occasion on which we are convened is certainly unique and extraordinary. We are met to do honor, not to one of our own fellow-citizens for distinguished, patriotic services to his native land, but to one who was personally a stranger to nearly all who are here present, yet nevertheless was known and honored throughout the civilized world. Last Saturday his body was interred in Westminster Abbey. The procession which followed his remains, we are told, filed its way through crowds of sorrowful men. Men of the highest rank in Church and State took part in the funeral pageant. The Queen and royal family were represented amid this token of general sorrow. And who was the man thus honored by those high tokens of respect and assigned a resting place in that spot which England has reserved for her mighty dead? He was not one of her own statesmen who had charmed the British senate by his eloquence and was brought to sleep by the side of Chatham, Fox and Canning. He was not one of her great and brave admirals or generals brought to sleep by the side of Wolfe and Nelson. He was not one of her poets, philosophers or historians, like Gibbon, Newton or Macaulay, whose works will ever be regarded as the grand jewels of English literature. No; he was a man of very humble origin and of most singular modesty — a man who, when he first gained notice, was an unpretending Christian missionary going among the pagans of Africa. As the opportunities opened the sphere of his work enlarged, and he became one of the most successful explorers of that mysterious continent, which, since the days of Herodotus, has been a problem to the rest of the world. Having endured great pain and following out the path he had chosen, with great industry, he has become a contributor to the sum of human knowledge in the cause of science, civilization and Christianity. It is a good thing for us to honor the memory of such a man. Dr. Livingstone was truly a great man. What was his greatness? That is the question; and it receives an answer from the author of our religion. It is well when there is such a struggle for political place and power, when there is so much done to stimulate ambition, that the question which arose was settled. Upon a certain day our Lord and His twelve disciples were walking along the road, and He overheard them engaged in a very animated conversation. He did not interrupt them at the time, but when evening came He recalled the matter, and gave to them, and through them to us, a lesson of immortal wisdom, which, whenever and by whomsoever it has been reduced to practice, has

never failed to win the approbation of all right-minded men. It seems that that group of disciples, supposing that their Lord was to found a political dynasty, were in dispute among themselves which of them should be the greatest and who should hold the highest office in that new political empire. They seem to have been the prototypes of modern politicians. We do not know the particulars, but Matthew was a tax-gatherer and familiar with assessments, and we may suppose that he made claim for the administration of the Custom-house. Peter, bold, impetuous, noble-hearted, was not going to occupy any inferior place; and there was one man in the crowd who undoubtedly looked pretty sharp at the Treasury. "Whoever among you will be greatest, let him be your minister," he said. A new law was propounded that moment that never was dreamed of by Greek or Roman. It is well for us assembled in this western horizon to meet together, and do honor to the memory of a man whose life and achievements were among the examples of this great law. The object of Dr. Livingstone was not to win the things associated with greatness — ribbons, stars and titles. He subjected himself to trouble and labor in seeking the good of his fellow man, and when he entered upon this labor, he chose the least attractive part of the world. He went among barbarians, 40,000,000 of whom had been exported and sold into slavery. This was self-sacrifice. What an endurance of pain and hardship he underwent in this work, we can hardly conceive; but he devoted himself to it for the purpose of giving those barbarians the light of the Gospel, and lifting them into the dignity of Christian civilization. It was, indeed, meet and proper that queens, princes, lords and bishops should vie in doing honor to such a great man. It is well for ourselves to meet together to lift up this one idea, that there is a greatness which is not to be measured by an earthly standard — that there is some greatness other than devoting ourselves to making large fortunes; that there is some greatness other than being elected to the board of aldermen, or even to the position of senator of such a State as Massachusetts; that there is something greater than to be lifted to a place where one can inflate the currency as Eolus filled his bags with wind. Dr. Livingstone worked at his plan, not with spasmodic effort, but with untiring, unremitting toil, severing himself from his family and from the civilized world. He plunged into pestiferous jungles, waded through swamps, climbed over mountains, passed through regions filled with malaria, and explored districts where he suffered from tropical heat. Fever wasted his body to a skeleton, but he never thought of going back. He was determined to accomplish all

that he could — all that was within the reach of human industry. This was heroism of the greatest kind, different from that of the man sitting on his charger in the heat of battle when his blood was up, with the blast of war, and the shock of an army around him, knowing that the eyes of his country are upon him, and feeling that he may win all the honors that ambition ever pictured, just as Sir Garnet Wolseley, who has returned from a different embassy in another part of Africa, and has been granted titles, and all manner of honors. Livingstone was alone in what he did. He acted in cool blood. He had set his mind on a determined purpose, and was not diverted from it. He felt he must die among savages. He determined to do all in self-sacrifice for the advantage of the world. I am inclined to suggest a thought in this connection, that there must be always a union between true science and Christianity, which must always walk together in the world. Many Americans have done much for the country and the promotion of its fame, by devoting their time to the work of exploration and the cause of religion. They have shown, in an admirable manner, that there is one religion which can be shared in by all mankind. We do well to pay our respects to the memory of David Livingstone. It was meet that one of our own countrymen rescued him when he seemed to be utterly lost in the wilderness of Africa — it is meet that we should pay respect to his memory. His work is done. He sleeps in Westminster Abbey. He was a true son of science — a hero of civilization — a great missionary of the cross. He is gone, but his works follow him. In that day that prophecy has promised, when Ethiopia shall stretch out her hands — when she shall be redressed of the wrongs that prevail in her mysterious regions — the name of Dr. Livingstone will shine as bright as the stars in the firmament, for ever and ever.

ADDRESS OF REV. HENRY WARD BEECHER.

Rev. Henry Ward Beecher was loudly cheered by the spectators, on making his appearance on the platform. Chief-Justice DALY said: The audience has introduced Mr. Beecher, so it is, therefore, unnecessary for me to do so.

Mr. BEECHER said:

Mr. PRESIDENT:— I observe that there is a generous provision for you to-night, and that a number of speakers are to follow me, and I shall, therefore, be brief in my remarks. It is a good sign of the progress of civilization — not in extent but in quality — that commu-

nities are learning gratitude; and they are not learning with the men that are dead alone, but are taking living men and giving to them the joys of appreciation. For one of the signs of a superior nature is an exquisite susceptibility to kindnesses, to services rendered. It is a good thing for a community to call up all its humblest servants and those who serve it physically; those who by invention abbreviate the purposes of industry, making the condition of the great common people easier, and who, by condensing labor and cheapening it, give time to men for something other than physical drudgery. We would not stint the praise that goes to them that make life softer, and that, in the midst of society, increase the comfort of the non-heroic multitude. But there are those who give no immediate return, whose lives are fruitful. Such are eminently explorers and discoverers. I am met, when I speak of those who have so ceaselessly besieged, and yet never taken, the fortress of the Northern Pole, with the question, "What use is it? Suppose that the Polar regions were ransacked, and that men should shoot to and fro over the imaginary Pole, what then?" What then! Nothing, if all men's thought of value is something to buy or sell. Nothing, if you must have a physical equivalent and something tangible and visible. Much, if it be a value to add manhood to other manhoods; for he who takes his life in his hand and fights against nature, putting skill against force and the irresistibility of human will against the irresistibility of nature in her frigid zone, adds little to territory but much to manhood, and raises the whole thought which we entertain of heroism; and by fortitude, by patience, by endurance, by sturdy courage and by at least a few discoveries, brings back to us a treasure which makes the whole generation richer. For that which lifts the thought of man as with the power divine, that which enlarges the sense of being, is itself a gift, compared with which silver and gold are as dross. When men, therefore, have periled their lives and laid them down in the service of science, they may not have added many facts, they may not have discovered and added many truths; but they have left a record which will make society so much richer that it is worth all that they have suffered. And no men are doing more for us than those men who, in the study, or in the observatory, or in remote parts of the earth, are bringing general knowledge to the service of mankind by ways which make mankind richer, by the examples and the suffering and the heroism of those that achieve these things. We come to-night, Fellows of the Geographical Society, to pay our respect — no to lay the offering of our thanks before the name of one simple as a child, and great as any man in our time has been — David Livingstone —

an honorary member, I believe, sir, of this Geographical Society, to which Society, if not the very first, at least, perhaps the second, communication of his missionary explorations was made — one which, to the very last, we had occasion to remember with gratitude and with honor. It is fitting, therefore, that this Society should make mention of his name, and appoint an evening for the celebration in which we are now actors. That great wonder — that continent of Africa! If I had selected a place in which to play the hero, that would have been the last one suggested to my choice. Until very recently its swarming population was not in good odor with us. There have been a thousand reasons why we praised the European and the Caucasian, and were tolerant even of the Tartar and the Mongol; but the African has been beneath contempt, or, if at all tolerated, it was only as we found him in the far antiquity, the mythical African of a remote and improbable civilization. That great continent, which has been known for thousands of years and is almost absolutely unknown, the wonder of history and a phenomenon of geography, near to civilization, and on its own borders carrying the earliest, surrounded again and again, encircled by fleets and yet unpierced, defended by a thousand obstacles to discovery, it remains to-day the enigma of geography. To have gone forth to explore that continent, had one attempted it as a purpose and an ambition, would have been remarkable. But David Livingstone went on no such errand. He went as a simple missionary, who was as far from expecting the results which have transpired in his life as any person could have been. Going to South Africa he went to preach the Gospel to the benighted. He gave himself to this service by almost identifying himself with the population. He left civilization behind him and adopted the manners of the natives; he almost lived as the savages live. He learned thus their language, he entered into their sympathies and their feelings, he became as one of them. And if at that stage of his life one had looked upon it he would have asked, "What is all this for? How can a man of any sympathy bury himself up in this darkness, and live among brutal savages, and experience pleasure or joy?" But he was proving, unknown to himself, the declaration that "he that abaseth himself shall be exalted." For it was in this school that he was gaining the power to achieve the things that afterward made his name illustrious. He had learned the people and their manners. He had learned the language by which his labor was facilitated. Then, when disaster came upon him and all his missionary hopes of exploration, to open that continent to Christianity, to commerce, to civilization, were apparently overthrown

when he began this second stage of his work, at every step of it he reaped the benefit which accrued from his (as we might say) humble services at a primary school of missionary labor. The records of his journey are written, as I think, with exquisite simplicity and truthfulness. I know of no book more fascinating, not even, perhaps, "Robinson Crusoe," for Defoe's style was hardly more simple than was Livingstone's. I know it, because for years it has lain in my dining-room, and instead of desert I have taken "Livingstone," reading while others ate, until it has become almost as familiar to me as to my boyhood was "Robinson Crusoe." I know of no book that so enables one to look into the interior of a man—a man with vanity, but without improper pride, a man showing manhood at every step, and often under circumstances the most difficult—just such a man in the wilds of Africa, self-respecting, energetic, patient, persevering, manly in every way, as if he were walking before an audience at London, or were in the midst of the plaudits of New York. He showed himself more than a man—he was a diplomatist. It may be difficult to be a diplomatist among civilized nations when Greek meets Greek, where fierce and artful expedients are pitted against each other; but to be a diplomatist in the woods or among savages is a great thing. To be a diplomatist with an army or a nation at your back is one thing; to be alone with a few Makolulu servants about you, with no recognized civil powers near you but the kings and princes all through Southern Africa, is another thing. In all this he was a master man. Almost alone he traversed thousands of miles, first to the western coast, then back to the eastern coast, and then afterward that network of travel in the center of Africa, at every step relying on his own ingenuity, honesty and knowledge of the natives. He persevered where hundreds of men would have perished by their own want of experience or wisdom. Unscathed from out of a thousand dangers, he persevered until, not by the hand of man, but by the insidious encroachments of disease, he was laid away forever. This is a man who, if he had discovered no lake, if he had measured no mountain or revealed no valleys, would have added to the number of those by whom our children, looking back upon, will feel themselves ennobled, and aspiration will follow the reading of the life of Livingstone as long as a generous sentiment remains in the young heart. But in this great exploration the man was not seeking merely curious things; he was not prompted by that curious vagabondism which inspires many Englishmen to climb the Alps or to hunt throughout Southern Africa. His eye was perpetually upon the features of nature, loving

science and adding to her treasure. He surveyed the fields and opportunities, and he described afar the civilization that was one day to take possession of Southern and Central Africa. All the way through he thought how to extinguish the abominations, cruelties and inhumanities of the slave trade; everywhere, and higher than all these, how the name of his Master should be made honorable in the lives and conversion of these swarming myriads of Central Africa. Never were nobler motives grouped together. Never was a man for so many years so successful in conducting an enterprise with so few resources, under the inspiration of motives so high. When at last he fell, he had done a good work, and yet, like Moses, he only saw the promised land, but was not suffered to enter it. His geographical pride was to discover the sources of the Nile. He died without knowing that he had discovered them.

Fellow citizens, two great expeditions, almost at the same time, left the western and eastern coasts of Africa, wending their way toward Great Britain. On the west a British general, who deserves well of his country, who had conducted her flag honorably, had subdued rebellion and maintained the dignity as well as the rights of the country; on the east they bore the body of the dead explorer—the one and the other—toward the fatherland. As the living hero came, all England rose rejoicingly; the bells rang, the trumpets sounded, the streets were thronged, and all the people acclaimed “Bravo!” and he had deserved it. But a little space and the bells were tolled, and again the trumpets resounded and the streets were filled and the whole people were hushed; for they followed a bier. It was no general, but it was a simple man, who had gone out a missionary and had come back a hero. They bore him into Westminster Abbey. He lies among the honored dead of that national mausoleum, and no nobler form ever passed through its portal. Of the two—the living hero, justly honored and endeared to his country, and the explorer who carried at once in his heart the love of God and the love of man—the dead hero lying in Westminster Abbey I had rather be than the living general. England took with honor the living and the dead, and was herself honored in receiving them both, but more honored in the reception of the dead than the living—of this great man, who has been among the chiefest of explorers, the noblest of men, the truest of Christians among those heroes that have exalted humanity, and made it easier in all time for men to do great deeds patiently, humbly and well.

ADDRESS OF DR. I. I. HAYES.

MR. PRESIDENT, FELLOWS OF THE GEOGRAPHICAL SOCIETY, LADIES AND GENTLEMEN:—I am here to-night to speak of Dr. Livingstone as a traveler. Mr. Beecher has already pictured to you many of his great achievements in that direction, and they have been made the more clear to you through the careful geographical descriptions of Major Dane, while Dr. Adams, with his usual eloquence, has portrayed the missionary life of that extraordinary man whose body was, on Saturday last, laid away with the mighty dead in Westminster Abbey—that mausoleum of the great.

If I do not feel that I have the power fully to analyze the character of Dr. Livingstone as a traveler, there is perhaps one point upon which I may freely dwell with justice to the living and the dead. It is the spirit by which that great traveler was animated, and with which no man of any time was so completely filled since Marco Polo first taught the world what a traveler might be. It is the spirit of discovery which guided his whole life.

I have often asked myself, "Why is it that Dr. Livingstone appeals so strongly to our sympathies? Why is it that to-day the thought of the world centers about the name of that great man? Why is it that the Royal Geographical Society of London and the American Geographical Society of New York should vie with each other in paying homage to his memory? Why is it that the great throbbing heart of the whole world has so promptly and so earnestly responded to the energetic efforts of the New York *Herald* to reclaim the lost wanderer and bring him back again to civilization?" and the answer comes: It is because we find in him strongly expressed a law of our being which, more or less, governs us all. It is that we all seek after hidden things in nature—seek to discover something that is new, to experience a new emotion in a new triumph, to do something that may enlarge our mental and material vision; it may be something that "the world will not willingly let die." For are we not all natural-born travelers? True, we are governed by different desires. One travels to gratify a roving curiosity and satisfy undefined fancies; one desires to wander by the sea and listen to what the wild waves are ever saying; another to climb some dangerous mountain height; another to ramble through the great cities of a foreign land; another to roam among the ruins of the past. But Livingstone's was a higher, a nobler ambition than any of these; for his ambition was to tread the wilds of unknown lands, and bring to light that which had been so long hidden from all the world.

While we readily discover in the ordinary traveler a vein of selfish gratification, a desire simply to please him or herself, we find in the traveler Livingstone that which arouses our highest admiration, the noblest spirit that ever animated man — the spirit of self-sacrifice for the benefit of his fellows. That there was a degree of pride in all he attempted to do we must admit, but it was a pride which claims our sympathy and respect. It was the same pride which caused Columbus to face the dangers of the great unknown sea; it was the same pride that thrilled Magellan, when in the midst of mutiny, as he emerged from the straits which bear his illustrious name into the broad, sweeping waters of the Pacific, he answered the demand to turn back, in dread of prospective starvation, "We will on, on to the west; we may eat the skins from our yards, but we will not turn back." It was the same pride that led the immortal Franklin to crowd his way among the crushing icebergs of the north to find the path-way to the Pole.

David Livingstone was a great traveler; and, my friends, that means much. A man may travel all the world over; he may visit every land, he may rest in every clime, he may speak every tongue, he may have been entertained by the great of every people, and yet not be a great traveler. When St. Paul, near the close of his unequaled career, after having addressed himself to vast throngs of almost every people of his time, uttered these words, "I have been made all things unto all men," he defined truly the character of the great traveler.

The great traveler is one who leaves no enemies in his rear, for he assimilates himself to the people about him. Staff in hand he pushes out into untrodden pathways, fearless and free, recognizing all men as his common brethren. Such a man was Marco Polo, and such a man was David Livingstone.

For the space of a generation Marco Polo traversed the hitherto unknown regions of Central Asia, passing without fear among the Tartar tribes, wherever he went making friends, and finding everywhere unknown tribes eagerly awaiting his approach, until at length he reached the mighty monarch of the East — the great Khublai Khan — who, while ruling over countless millions of people, made the traveler his trusted counselor. And now in later times we find another such traveler, for the space of a generation, wandering through Central Africa. It is Livingstone, who, like Marco Polo, traversed hitherto unknown regions, passing from country to country and from tribe to tribe, oftentimes in the midst of wars and bloodshed, and was, like Marco Polo, not molested in his course by hostile

demonstrations; for he was the instinctively recognized friend of all, the faithful and unquestioned ally of mankind everywhere, and with his patent of nobility stamped upon his forehead, we see him moving freely on his course toward the achievement of his great mission. He made himself all things unto all men. Adapting himself to their situation, always appreciating their condition, abusing none of their prejudices, never with violence attacking their superstitions, never seeking to instruct them beyond their capacity to learn, kind and gentle always, cheerful always, loving always, he endeared himself to every one he met.

Marco Polo and David Livingstone stand out as the typical travelers of different epochs. The one traversed the lands of the Orient, grew rich and told the story of a life which set the world ablaze with enterprise, and brought about the discovery of America. The other traversed lands that were poor in what we call wealth, but he inaugurated a series of discoveries which led to the sources of the Nile and caused the mystery to clear away from the most interesting geographical problem of our time.

The whole secret of success with the traveler rests in the heart and not in the pocket. It is the manhood of the traveler that achieves success. Above all things the traveler must be sincere.

In illustration of the self-confidence, of sincerity, of motive and singleness of purpose in the accomplishment of an aim among uncivilized peoples, let me recall to you the story of Captain Lyon, who, when about to start for Africa, had a protracted consultation with the official committee. Leaving them at length to discuss in private the outfit with which he was to be supplied, Captain Lyon strolled down the street. Returning in half an hour, he found them still in consultation. The chairman said, "Captain, we have been discussing your outfit, but have not yet arrived at a conclusion as to what it should be; we would be glad to have some suggestions." The Captain promptly replied, "O! don't trouble yourselves, gentlemen, my outfit is already purchased." "Indeed!" exclaimed they all in concert. "Yes; I bought it while I was out, and here it is," whereupon he produced a tin cup. Much wondering, they asked what he meant. "Why," said he, "I can drink from that, I can cook my meals in that, if necessary, and as for the rest, I trust to the people. I would advise every traveler to buy a silver cup if he can afford it, as it will last longer, but I can only afford a tin one."

Buy a tin cup and trust to the people! Trust to the people! The man who did this heartily was never yet disappointed. The man who never lied to the people by word or manner was never harmed,

but has passed safely through their lands, were they even the veriest savages.

A great truth underlies this story. It is this—success cannot be achieved without the friendship of the people, and that once gained is far more than treasures of gold, and silver, and precious stones. But in all this, there must be natural, unfeigned sincerity. One may be a hypocrite in civilized life and succeed in his desires by so doing, but he cannot palm off such broken wares upon the savage.

David Livingstone possessed all these qualities of the great traveler; and besides a cool courage, he had calm judgment and great discretion, but, over and above all, he was the embodiment of truth itself. “To ride a horse, to bend the bow, to speak the truth,” was to be a man in ancient Norseland. “A man, a word,” it became, later—and Livingstone was a true son of his ancestors. And he possessed the loftiest bravery. That man is not necessarily brave who cuts his way through great obstacles at the head of an army, and who takes the lives of those who oppose his onward march; but he is truly brave who coolly and calmly encounters whatever lies in his pathway, and by discreet calculation makes his way around opposing obstacles, and wins to his side all whom he meets, claiming their confidence and support, and causing them to become his assistants rather than his opponents, and when he has departed, leaves behind him a memory of love, and kindness, and simplicity, that will cause the barbarous companions of his toil to speak of him with tender veneration. This is the true hero, and such a hero was he whose memory we have gathered here to honor.

David Livingstone had a sincere desire to benefit mankind. It was not alone that he was kind to the ignorant savage who waited on him, and helped him forward on his journey; he desired to see the world improved by the extension of knowledge. “To diffuse knowledge among men,” was the purpose of the liberal-minded Smithson; but to create knowledge was the aim of Livingstone; and in this he saw a halo of light to guide coming generations to a higher level of manhood and of brotherhood. This, as it seems to me, was the guiding star of his life, and his record shall, in consequence, live through all time. From where the Atlantic rolls its hoarse notes along the Western coast, to where the spice-laden breezes of the Indies chime their melodies in the east; on the borders of the inland seas, along the banks of the sluggish streams, throughout the deep, dark shades of the almost impenetrable forests, Afric’s dusky children shall tell from generation to generation, of the mighty deeds, the unwavering valor, the dauntless courage, the mild and

gentle manners of the great white man who passed for a quarter of a century up and down along their sunny fountains like an angel of mercy.

I can comprehend and sympathize with the throbbings of that great man's soul, as isolated from home and kindred he wandered among the savage tribes, in the midst of trials and obstacles, in search of the great object of his restless ambition. I think I can understand his feelings as he forced his way through impediment after impediment, never tiring, never fainting, never yielding, whatever his privations, thinking not of the life he was exhausting, forgetting the sacrifices he was making in pursuit of his great aim, when from amidst the dark and gloomy shades of those unbroken wilds first flashed upon his bewildered gaze the waters of the inland sea, which he at first believed to be the fountain of the Nile, and I think I am not a stranger to the emotions he must have experienced, when, upon further exploration, his seeming success paled into disappointment; for, when I recall that experience of his life, I remember my own emotions as I stood upon the shores of the open sea beneath the Pole, after three perilous attempts, and realized that my ship, which should have taken me to the goal within my reach, was frozen fast in the ice hundreds of miles behind me.

I think I understand the purpose that animated him when he refused to accompany the intrepid Stanley back to civilization, and decided once more, in his old age and wasted strength, alone to push out still farther in search of the dream of his life; for after twenty years of struggle and disappointment I have not yet abandoned my fixed and steadfast purpose to reach the North Pole by way of Smith's sound.

I seem to see him as he wends his way, leading his savage followers, who cling to him with blind enthusiasm, unable to comprehend why the white man should always choose danger and face death, rather than quiet and safety. Ah! that man was seeking truth, and he knew no other following.

We know not yet the full measure of his achievements. We only know that, steadfast to duty, he had finished his work, and had finally turned his face homeward, when the grim messenger he had so often thwarted, met him on the way and struck the fatal blow, and he fell when he had won his victory, leaving behind him an example of fortitude and devotion that shall be an example to the latest generations.

His work is done, and well he did it; and they have laid him away

"In the great Minster's transept, where light-like glories fall,
And the sweet choir sings, and the organ rings
Along the emblazoned wall."

And here the curtain drops upon a life. It is not given to us to know more than that which we have seen, but what we have seen gives us hope and strengthens our courage. We have watched this great man's career. We have seen him hand in hand with his two guiding spirits—the spirit of discovery and the spirit of the Christian faith. Future generations only can tell the harvest to be gathered for civilization from the seed he has sown. He has indeed planted the germ that shall yet cause the wilderness to bud and blossom as the rose. He has erected for himself in man's affections a monument that shall endure long after the grand old pile which now enshrines his ashes shall have crumbled away to dust and been forgotten. Empires may rise and fall; nations may be blotted out, and known no more; rulers, statesmen, warriors lost in oblivion; but the name of the great traveler whom we mourn to-day shall never fade while the spirit of Christianity and the love of truth animate the souls of men.

ADDRESS OF REV. NOAH HUNT SCHENCK, D. D., OF BROOKLYN.

MR. PRESIDENT:—I do not flatter myself that it is at all within the range of my poor ability to contribute to the interest of this occasion, after the eloquent and exhaustive deliverances of the distinguished men who have preceded me. Still I would essay the discharge of the pleasing duty you have imposed, and weaving into expression certain sentiments of appreciation, lay them as a wreath of immortelles upon the tomb of Livingstone.

The possibilities of human development have no finer illustration than in the story of him whose merit and memory we are met to honor. A few days since, the noblest of the land gathered in London, under the groined arches of

“— that temple where the dead
Are honored by the nation,”

to pay the ultimate tributes of earth to all that was left of the great African missionary and explorer, committing in solemn services the body to the ground, and the soul to the God that gave it, leaving the honored ashes in the mausoleum of England's mighty dead, dropping upon them the tears of affection, and offering over them a reverential *Laus Deo* that such a man had been given to the age and race, not only because of the good he had done, but for the illustration he gave of elevated manhood.

It is less than sixty years ago that David Livingstone was born. He was fortunate in the majestic elements of natural grandeur that environed the spot of his nativity. It was on the beautiful banks of

the Clyde, and near where Ben Lomond lifts his "bald and towering crest," and almost in the shadow of Dumbarton's "castellated crag." His father was a poor shopman, of whom there is little to say, except the honorable tradition that "he was too honest to get rich." The *res angustæ domi* soon compelled young Livingstone to seek elsewhere for a livelihood, and for many years he threw the shuttle as a weaver's boy. But his mind meantime was busy, and his time was rigidly economised. There were invisible threads with which he was concurrently occupied,—weaving in the warp and woof of character elements of beauty and utility, which, when afterward touched up by the hand of experience, presented to the world a finished specimen of human tapestry.

When somewhat relieved from the pressure of toiling for his daily bread, Livingstone devoted himself to the study of medicine, and afterward to careful preparation for the Christian ministry. He proposed going to China, but upon the showing that his services could be more useful in South Africa, he promptly accepted this as the scene of his evangelizing labors, and for one-third of a century he has made his home in that land, over which the pall of barbarism has so mysteriously rested. His zeal, modesty, self-sacrifice and single-hearted devotion to the great end contemplated first and last, are unparalleled in the history of missions and scientific exploration. He carried into his missionary effort, in well-ordered methods, an intelligence and discriminating sympathy which insured a peculiar and unprecedented success, and which has won for his work a world-wide approbation. But appealing from the rigid conventions of missionary administration, Livingstone proposed and pushed the grand idea that Christianity and science, as the twin pioneers of the highest civilization, were necessary for the moral redemption of Africa. Under this inspiration he threaded the mazes of wilderness and desert, planting the foot of exploration along routes never before pursued, except by the savage sons of Ham; telling of Christ to those who had never before heard the name; and offering devotions where the rocks had never echoed the sound, and the air never been moved by the pulsations of prayer. The results of all this are in part matters of history and scientific record; but the consequences shall be ever-flowing, as a fountain once broken forth and affluently fed by hidden but exhaustless reservoirs. But, alas! the hand that touched the rock and opened a way for the waters, is paralyzed in death. And the great man died with his harness on. He fell upon the field, but they have brought him home to sleep. They have laid him to rest amidst the best and the bravest. Around him are heroes,

and statesmen, and poets; men of art, men of letters, and men of sublime philanthropy. But amidst the rich memorials of sleeping greatness, there is no

“*Storied urn or animated bust*”

whose legends tell of a nobler life than that of David Livingstone.

The splendid pageant of his obsequies was a fitting close to the story of a career at once so modest and so majestic,—begun in a little hamlet in the romantic Highlands of Scotland, pursued for the whole work-time of life in the wilds of Africa, and concluded amidst the architectural glories of the great cathedral where society and the State, by their representatives of highest worth and rank, thronged the historic aisles, and vied with each other to do reverence to the honored dead. Hither came Livingstone, ushered by no such Valhalla cry as that which is said to have burst from Britain's heroes, and spurred the hot desire for fame, when bracing to the shock of battle, “*Victory, or Westminster Abbey!*” but hither was he brought from a lonely exile, where in silence and solitude he wrought at his life-task, with the love of man for his inspiration, and the love of God for his reward.

But, turning from the spectacle of his august sepulture, and before the echoes of the great civic requiem have floated quite away, may we not profitably inquire into the springs of this eminent appreciation of Livingstone? Why is it that England honors, why do we and all the world honor him? The secret of this man's greatness, I take to be, was, that he made the most of what was in him. He put himself to the best use, and he did his work well.

The theory of Livingstone's life has not been properly apprehended in certain quarters. He has been taken to task for giving up the simple career of the missionary to put on the mantle of the scientific traveler, and enter upon the secular engagements of exploration. But how partial and prejudiced the judgment of such superficialists! How utterly inadequate the scope of such a vision to analyze the character or trace the circumference of the great sentiment that charged the man! That sentiment, and it was alike consistent in detail and duration, that sentiment was the desire to do the largest amount of good in his day to the human race. Actuated by this feeling he first accepted the commission of Christ, and labored zealously as a missionary. And let it be broadly published, and everywhere accepted for true, that he was not a whit the less a missionary when he became an explorer. On the contrary, this was only the widening of the field and the augmenting of his own effort,

and the pioneering and preparing the way for others who should follow him.

For ten or twelve years, Livingstone, though engaged in the ordinary duties of a missionary at Kuruman and Kolebeng was, one may say, in reality by this very experience, qualifying himself for his subsequent and more important work. Early in this period, from 1840 to 1844, he addressed himself not only to the study of the native dialects, but even more especially to the ways and wants of the people, their peculiar habits of thought, and domestic life. To this end he made his home with them, and became as one of themselves. Thus securing an introduction to and a thorough knowledge of the inner life of the natives, he ere long established a sympathetic relationship; and, in consequence, a certain magnetic mastery. Near the termination of this twelve-year term of comparatively stationary work, Livingstone made several exploring excursions, one extending as far as the Zambezi, and from the last of which he returned to find that Kolebeng had been overrun by the Dutch Boers; many of his people killed or carried into captivity; the whole settlement devastated and left in utter desolation, and the mission and its property utterly ruined by pillage, fire and sword. This was the turning-point of his whole career. Before him were the wrecks of more than ten years of earnest effort. And this because of the greed and brutality of men who were of the white race of the North, and who had lived under the influences of a Christian civilization. One such illustration was enough to satisfy this missionary that the evangelization of Africa was not to be accomplished by a few single-handed missionary efforts at remote and isolated points; but rather that it was to be brought about by introducing Christianity at work; that is, inviting the whole of the machinery of our civilization to the wilds of Africa. And so he resolved to give his life to prepare the way for it, by opening up the river highways, and disclosing the inland seas, and investigating the fertility of soil, and cataloguing the natural products of forest, field and mine. And more than this, to plant the seeds of sympathy and friendly feeling in the hearts of the tribes he should encounter in his way, preaching the truth of Christ not only in the revealed theories, but much more by the beauty of character and the eloquence of example.

And so it was, that he returned to the Cape, sent his family to England, and, after a brief season of scientific study under the Royal Astronomer, set his face to the north, and began his wonderful journeys of discovery and scientific observation which pursued lines of adventure reaching out for eleven thousand miles, and which covered

a period of more than twenty years. Let others, better qualified, rehearse the invaluable results to Geographical Science, but from my point of observation, I am bold to say, that the moral consequences of Livingstone's African embassy are incalculably great. His whole career in that land is a gospel epic. Aside from his faithful and never suspended oral deliverances of revealed truth, he preached by life as no man had ever done by tongue. His every act was at once a sermon and a practical illustration. He has left records which will become enduring traditions with the tribes and the localities; and long after you and I, Mr. President, shall have passed away, shall the redeemed generations rehearse with gratitude to God the memories of Livingstone, the pioneer and prophet of Africa's civil and religious renovation!

To the working out of his great undertaking, Livingstone invited neither personal co-operation in the field nor the backing of state patronage at home. He went forth single-handed and alone, like the shepherd boy of Israel, but strong in the consciousness of divine benediction. He marshaled the forces of his remarkable personal character, and with these for the weapons of his warfare manfully breasted the perils and the difficulties that bristled all along his path.

I regret that I have only space to speak a word of the moral forces which armed and mailed this man as he prosecuted his great adventures. It would be alike instructive and interesting to cite from the abundant illustrations which crowd the eventful record of his long and laborious journeyings. But without such corroboration, I am free to claim for Livingstone, first of all, and most conspicuously, *great singleness of purpose*. From the hamlet on the Clyde to the rude hut which canopied his Ethiopian death-bed, the avowed and recorded aim and end of his life was never for a moment blurred or overwritten. Nothing ever diverted him from the line of his effort, and if he had no other element of distinction, this alone would have signalized his career.

But to this oneness of idea and effort, were appended, as agents of execution, a *determination and fearlessness* almost, if not quite, exceptional in the record of bold exploration. When we remember that he entered upon his expeditions into unknown regions, without the possibility of help in case of disaster; that he encountered the perils of wild beasts, and the more fearful craft and cunning of the wild and savage aborigines; that he was exposed to the poisonous malaria of swamp and jungle; that for months together he was dependent upon the precarious products of the forest and stream, for the means of sustaining life, and that, under a tropical sun,

fatiguing marches and wasting fevers were to be accepted of necessity, as enfeebling frictions if not fatal foes; of a surety, nothing less than a sublime heroism could have nerved a man for such threatening and danger-fraught ventures. But with Livingstone, one expedition followed another, with determination undaunted, with a purpose and programme into which the element of fear never entered.

The *modesty, and utter absence of self-assertion* in Livingstone, are entitled to honorable mention. I have never read of a man who seemed to claim so little for himself. With him the individual was lost to view in the magnitude of the cause. Here we have the crucial test of true greatness. There is not a single incident in the career before us, that conflicts with this. On the contrary, recall for illustration, the signal instance of Livingstone's disappointment—for disappointment it must have been—in not being the first to publish the true explanation of the geological structure of Central South Africa. Many theories had been advanced, all of which Livingstone had, by topographical observation, found to be inaccurate. The true idea he was the first to derive from local investigation; and when he came to report the important scientific fact, that the region of his explorations was a great concave stratification, he then learned that Sir Roderick Murchison had already demonstrated before the Royal Geographical Society, years before, the same conclusion, as the result of his own investigations, deduced from data previously matters of scientific record. This, instead of exciting a feeling of antagonism, only served to draw these *savans* in geographical science sympathetically together, and paved the way to a friendship between them, which Livingstone fondly cherished to the close of his life.

I approach the conclusion of what I have to submit on this memorable occasion, with a feeling somewhat akin to regret. For it is inspiring, Mr. President, to our sentiment of manhood, thus to contemplate the career of one who gave his life to redeem a continent from barbarism, who has extended the area of Christian homes for the world's population, and who, augmenting the commerce and wealth of the race, and contributing to the scientific knowledge of the structure and resources of the orb we inhabit, at the same time helps to prepare the way for the world-wide establishment of revealed truth and Christian civilization.

May I crave permission at this point, to recall your minds to a somewhat singular event in the annals of exploration, which has an incidental bearing upon the general topic under remark? Toward

the close of the fifteenth century, synchronizing strangely enough with the date of the discovery of America, a fleet of Portuguese explorers landed a numerous and well-armed body of men on the east coast of Africa, near to Zanzibar, and probably not far from the very point, Bagomoyo, where, four hundred years after, the embassy of the New York *Herald*, under the leadership of Stanley, started for the interior, on the search for Livingstone. This Portuguese expedition was in quest of that mythical prince, Prester John. For two centuries, romantic rumors of this half-historic, half-imaginary personage had floated through Christendom. The original idea of his Nestorian priesthood and his Persian principality, having been proved to be without warrant, upon the foundation of a conjecture, started, no one knew where or by whom, and having no authority, or even recognized paternity at the moment, an expeditionary force was sent out by the adventurous king of Portugal, and the fleet finally came to anchor off the Zanzibar coast. Disembarking here, the little army, with the *impedimenta* necessary either for military operations or for ingratiating negotiations with a king and court, reputed to be unparalleled in magnificence and state, penetrated the interior for hundreds of miles. It is held by many whose opinions are entitled to respect that between the sixth and eighth parallels of latitude, these strange adventurers pressed their way, enduring the while with a glad enthusiasm and heroic fortitude the terrific heats of a tropical sun, until at last, when probably finding their further progress barred by the lake, now named Tanganyika, they became disheartened or dismayed, and so returned upon their course, and once more sought their ships. How remarkable the fact, that the line of the march of these pilgrim Portuguese was so nearly identical with the path that Stanley trod searching for Livingstone, and that the ultimate camping-ground of the Portuguese was probably that over which the exploring feet of Livingstone had wandered during the very latest journeys of his life. The Portuguese had gone in martial array, seeking one, who, they imagined, gave lustre and renown by his princely state to the religion of Christ. Stanley went bearing a flag that symbolized the Christian civilization of a hemisphere, of which these Portuguese had never heard, looking for a man who, for some time past, had been lost to view, but who, meantime, was pioneering paths of discovery to the heart of a continent, opening up highways for the winged feet of science, and multiplying facilities for the propagation of that glorious religion which at once dignifies the Creator, and ennobles the creature. The Portuguese went on an embassy

from an earthly king, that they might establish ecclesiastical commerce with one who, they supposed, would aggrandize with pomp and circumstance, the temporal estate of the church of God. On the same strand of Tanganyika, which they stamped with their footprints, four centuries later strode Livingstone, indenting the sands with knees as well as feet, holding before him the grander idea of emancipating a race from idolatry, and redeeming a continent from inutility, and so preparing new kingdoms, and founding new churches for God and His Christ.

As a matter of excusable national pride, will you pardon a word more, Mr. President, touching the expedition which was projected and prosecuted by the *New York Herald*, or (as we may say, without trespassing upon the impersonality of its proprietorship), by Mr. Bennett, for the search and aid of Livingstone. The unprecedented enterprise of this great agent of current intelligence, was crowned with a success, which may properly be styled renown. I must believe that the author and promoter, as well as his intrepid agent and executor, projected and "builted better than they knew." What was designed for business, resulted in honor and fame for themselves and for their country. The *Herald* enterprise accomplished for Livingstone, as it eventuated, more than all that was attempted in this direction by the British government. It carried necessary supplies to the explorer in advance of the help ordered by England, and so keeping him in the field, which he otherwise must needs have abandoned, secured to the interests of science and religion, many months more of active service in exploration and missionary effort. It is not, therefore, saying too much, to claim that the expedition of the *New York Herald* in the search and for the help of Livingstone, has connected his name inseparably with America, and given to our country a large share in the glory of his splendid achievements in Africa.

Mr. President, the greatness of the man whose name and fame we celebrate and solemnize in the memorial services of this occasion, are not to be segregated for the embellishment of any one race or nation. Livingstone belongs to the Christian world. Though born in Scotland, Scotland does not own him. Though prosecuting his heroic labors under the "meteor flag" of England, he belongs not to Britain alone. Though he toiled beneath the torrid sun of Africa, Ethiopia cannot claim him as peculiarly her son. Though his later sympathies went heartily forth, gratefully recognizing this western land as the home of those who practically vindicated love and cordial fellowship in the hour of sorest need, yet America has no peculiar

interest in the glory of Livingstone. Though he has been laid to rest in England's proudest minster, that minster does not hold him. His character is too great to be the property of any race, his work too vast for the ownership of any nation. His glory is the possession of the Christian world. His Evangely is the inheritance of the brotherhood of man. He was too large in purpose, too grand in work for any thing less than Catholic human fraternity. Least of all and last of all, may it be said of Livingstone, as was charged upon Britain's greatest statesman —

“Who, born for the universe, narrowed his mind,
And to *England* gave up what was meant for mankind.”

VI. ADDRESS.

BY DR. F. V. HAYDEN.

OUR GREAT WEST, AND THE SCENERY OF OUR NATURAL PARKS.

A large audience assembled at Association Hall, Wednesday evening, April 15th, to listen to Dr. F. V. Hayden; Chief-Justice DALY in the chair. After a few introductory remarks by the President, he said:

MR. PRESIDENT, FELLOWS OF THE AMERICAN GEOGRAPHICAL SOCIETY, LADIES AND GENTLEMEN:—I beg permission to call your attention this evening to a few of the interesting geographical features of our great West. It is fortunate that by means of the photographer's camera and the stereopticon, we can all travel together by physical, as well as mental vision, over this most wonderful region. Let us look for a moment at what we believe to have been the plan of growth of the physical history of the western portion of our continent. Prior to the explorations of Lewis and Clark, in 1803 and 1804, it was supposed that the Rocky mountains consisted of a single ridge or range, extending from north to south, or at least one main range, with a few minor ranges. And all the old maps were constructed on that plan. Our present knowledge reveals to us the fact that the name "Rocky mountains" is only a general and rather indefinite term, including an almost limitless series of ranges or folds like the waves of the sea. From the eastern slope we pass over range after range, for 1,000 miles or more, until we descend the western slope of the Coast range to the Pacific ocean. The greatest width of this remarkable series of ranges or folds, is near the 40th

parallel. Suppose that we were to glance at a profile of the country along the line of the Pacific railroad from Omaha to San Francisco. We shall be led to believe that the great area west of the Mississippi was originally an enormous plateau, out of which was evolved the different ranges of mountains as if thrust up by some volcanic force. According to the railroad level, Omaha is 966 feet above tide water; one hundred miles west of this point, the elevation is 1,470 feet, indicating a gradual rise of five feet per mile. At Cheyenne, near the eastern base of the Rocky mountains, 516 miles west of Omaha, the elevation is 604 feet, showing a gradual rise of ten feet per mile. From this point to Sherman, the highest point of the Laramie range, where the elevation is 8,242 feet, the distance is only thirty-three miles, and the grade is suddenly increased to sixty-six feet per mile. From Cheyenne to the Sierra Nevadas the general level of the plain country varies from four thousand to ten thousand feet, while some of the highest peaks attain an elevation of from fourteen thousand to fifteen thousand feet above the sea. Suppose we turn aside from our course for a moment and travel along the immediate base of the Eastern range. For one hundred miles to the southward we shall find that the great Colorado or Front range, of which the snow-covered summits of Long's and Pike's peaks form a part, rise abruptly out of what appears to be an almost level plain, and we shall see the various sedimentary formations elevated to view, as if the vast granite nucleus had been thrust up vertically, leaving upon its sides the sandstones and limestones of the more modern beds inclining at various angles. But we cannot stop here to solve the numerous problems which these magnificent scenes bring before the thoughtful mind, but hasten onward toward the great National park, at the sources of the Yellowstone and Missouri rivers. Crossing the Laramie or Front range, which is about twenty miles in width, we descend a gentle slope to the Laramie plains. Along the immediate line of the Pacific railroad we do not cross another range of mountains until we reach the Wasatch, which forms the eastern rim of the Salt Lake basin, and gliding through the Wasatch mountain, by way of the Weber Cañon, we soon arrive at Corrinne, 1,055 miles west of Omaha. In this long distance we pass over only two ranges of mountains and not over twenty miles in width of granite rocks. The Laramie plains differ in elevation in different parts from six thousand to seven thousand feet above the sea, and after passing the water divide at Creston, seven thousand and thirty feet above the sea, we gradually descend to the valley of Salt Lake, which is about four thousand four hundred feet above

tide-water. At Corrinne we leave the comfortable traveling by rail, and continue our journey northward by stage to Virginia City or Bozeman, Montana. While at some future period there may be nearer routes to our great National park, these are the most accessible approaches at the present time. The little town of Bozeman is located at the head of the Gallatin Valley, while Virginia City is about seventy miles to the south-west of it, on a branch of the Jefferson river. At either of these points an excellent outfit and guides can be procured for a trip through the park. If we make Bozeman the point of departure, we shall cross over the divide between the headwaters of the Gallatin and Yellowstone river into the Yellowstone Valley, and travel up that beautiful valley with its lofty, picturesque mountains on either side. A journey of sixty miles will bring us to the north boundary of the park, to the Mammoth Hot Springs, one of the most remarkable scenes in the world. We shall then continue on our way up the valley, stopping to admire the Tower Falls and other scenes until we reach the lake. Then over the divide again to the eastward we pass into the upper and lower Geyser basins, where the grand geysers are located, and then down the Madison Valley to Virginia City. If we were to make the latter place our starting point, the tour would be simply reversed. This round trip would comprise the principal objects of interest in the park. It would require from three to six weeks and embrace a distance of about 250 miles. I will now call your attention to some of the principal points in the geographical features of this most interesting region, as shown on the map of a portion of Montana. At the north side, near longitude $111^{\circ} 30'$ and latitude 46° , is a remarkable geographical point called the "Three Forks of the Missouri," the junction of the three great branches — the Jefferson, Madison and Gallatin — so named by Lewis and Clark in 1803-4. Rising in the high area about 100 miles to the south, the courses of the streams are very meandering, and they drain an area of about 100 miles from north to south and about 150 from east to west. They finally unite to form the Missouri within a few yards of one another. The elevation at this point is 4,132 feet, and rapidly increases toward the sources. These beautiful valleys were, in the pleiocene times, the basins of large fresh water lakes, the waters of which extended up to the foot of the mountains, and it is to these marly lake deposits that most of their beauty and fertility is due. In the autumn of 1872, as I stood at the entrance of West Gallatin Cañon, the view down the valley could not have been surpassed even in this land of picturesque scenery. The gently-rolling grass-covered bottoms, the little

streams meandering through them, fringed on either side by a thick growth of cottonwoods, the numerous farms, golden with their fields of wheat, and over all, in the distance, that peculiar soft golden haze which characterizes the autumn days in this mountain region, lend to the whole scene a charm that is long remembered. As the setting sun of an autumn day shines upon the valley and surrounding mountains, all objects seem to be invested with an unusual beauty, which reminds one of the lines of the poet—

“And sweet calm days, with golden haze,
Melt down the amber sky.”

At least fifteen or twenty small branches unite to form the Gallatin, which have their sources far up in the mountains. Mr. Jackson, the photographer of the survey, penetrated this region for the first time in 1872, and obtained in it some most marvelously beautiful views of the scenery. Palace Cañon and Palace Butte, which I now show you, are formed out of the stratified tuffs and breccia, and the palace-like forms were carved out of the solid volcanic material by the slow process of erosion by water. You see here the very birthplace of the mighty rivers that are ever flowing onward thousands of miles to the sea. The snows on the mountain summits supply the waters that are gathered by the myriads of little branches, finally uniting into one great river which flows down to the Gulf of Mexico, irrigating and fertilizing millions of acres of land in its course. But we must hasten on our way over the divide into the valley of the Yellowstone, and passing many objects of great interest, which our limited time will not permit us to notice here, we arrive at the north limit of the National Park, at the Mammoth Hot Springs on Gardiner's river. This little stream empties into the main Yellowstone from the east side, and as we wind our way up the valley, on the east slope of the mountains, we suddenly come upon one of the most marvelous groups of hot springs in the world. The sediment deposited by the springs is mostly calcareous. So that we have two classes of springs in the park—calcareous and silicious—the former depositing lime, and the latter silica. These calcareous deposits cover an area of about two square miles. The picture presents to the eye the appearance of a frozen cascade. A system of step-like terraces is formed by the water, that will ever defy any description by words; the eye alone can convey any adequate conception to the mind.

We have before us an illustration of the mountain slope, ornamented with a series of semi-circular basins or pools, with margins varying from a few inches to two feet in height, and so beautifully scalloped and adorned with a kind of bead work, that the beholder

stands amazed at this marvel of nature's handiwork. Add to this a snow-white ground, with every shade of color, pink and yellow, as varied as our aniline dyes, and the attractiveness of the picture is greatly intensified. The pools or basins are of all sizes, from a few inches to six or eight feet in diameter, and from two inches to two feet in depth.

As the water flows over the mountain side from one basin to the other, it constantly loses a portion of its heat, and the bather may select any temperature he may desire. The wonderful transparency of the waters of these springs surpasses any of those of the kind I have ever seen in any other portion of the world. The sky, with the smallest cloud that flits across it, is reflected in its clear depths, and the ultramarine colors, more vivid than the sea, are greatly heightened by the constant gentle vibrations. Although these springs are in a constant state of violent ebullition, emitting carbonic acid gas in considerable quantities, yet the temperature does not usually rise higher than one hundred and fifty or one hundred and sixty degrees, the highest being one hundred and sixty-two degrees. The old ruins that cover the larger part of this area are not the least interesting and important portion of their history. One high cone, which we call the Cap of Liberty from its shape, must have been a geyser at one period, but it is now extinct. The water must have been thrown up by a continuous succession of impulses, like a fountain, depositing by evaporation the sediment in the form of the overlapping layers which we see in the photograph. Finally it closed itself up at the summit and perished, and now remains a monument of the past. It is forty-two feet high and about twenty-five feet in diameter at its base. We might dwell for hours on these remarkable springs, but we must hasten onward. We will just glance at the curious illustrations of columnar basalt in the sides of the Yellowstone Cañon. The Lower falls with its grotesque beauty,—the tall gothic columns of volcanic breccia surrounding it like sombre sentinels. The Grand Cañon is about thirty miles in length, and has been carved out of the solid mass of trachyte, volcanic breccia and hot spring deposit. The Upper and Lower falls are within a quarter of a mile of each other. The Lower falls are three hundred and ninety-seven feet in height, while the Upper are not more than one hundred and forty feet. From the falls to the lake the distance is about fifteen miles. Groups of hot springs, mud puffs and wonderful steaming cauldrons meet us at every point. There are several groups, as the Crater Hills, Mud Geysers and other localities, comprising in all more than five hundred, of various degrees of importance. The lake itself, which is really the

source of the Yellowstone river, is about twenty-two miles in length from north to south and twelve to fifteen in width from east to west. The elevation of the lake is seven thousand seven hundred and eighty-eight feet above sea level, and its height may be, perhaps, better appreciated when we state that if Mount Washington was placed in its basin, the surface waters would roll fifteen hundred feet above its summit. To describe its wonderful beauty in detail here to-night would detain you too long. It is sufficient for me to say that it is not surpassed in the picturesqueness of its surroundings by any other mountain lake in the known world. High ranges of mountains, with their summits covered with perpetual snow, gird it on every side. Its greatest depth is three hundred feet. Its waters are full of trout. On the north-east side of the lake there is a group of hot springs, about three hundred in number. Several of them extend out into the waters of the lake and have built up cone-shaped mounds of pure white silica, and, being entirely disconnected with the surrounding cold waters, are at all times at boiling point nearly. In the cold water, trout weighing from one to three pounds are very abundant, and the traveler may stand on the silicious mound and hook the trout and cook them in a few minutes in the boiling hot springs under his feet. The divide between the Yellowstone and Snake rivers at one locality on the north side of the lake is not over three hundred feet above its waters, and the source of the Snake river comes up within a mile of the lake. The Atlantic and Pacific waters could easily be connected together. This is an interesting fact in a geographical point of view, but the idea of connecting the waters of the Atlantic and the Pacific for the practical purpose of transportation is a far-off vision of the future, when congress can vote fifty millions of dollars or more for the purpose without a murmur. The views from the mountain peaks around the lake are far-reaching and remarkable for their picturesque beauty. From the summit of Red mountain on the south side of the lake, ten thousand three hundred and forty-three feet above the sea, the scope of vision embraces a radius of one hundred to one hundred and fifty miles, within which over four hundred mountain peaks, ranging from nine thousand to eleven thousand feet in height, may be distinctly seen. This may also be regarded as the water apex of the continent. The general elevation is seven thousand to eight thousand feet, and within a radius of ten to twenty miles are the sources of three of the largest rivers on the continent. Flowing northward are the numerous branches of the Missouri and Yellowstone rivers. To the south are the branches of Green river, which, uniting with the great Colorado of the west, finally flows into the

Gulf of California, while south and west flow the branches of Snake river, which, uniting with the Columbia, pour their vast column of water into the Pacific ocean. From this mountain an area of not less than 50,000 square miles is swept within the circle of vision. Ten large lakes and several smaller ones, with the entire National Park, is spread out under the eye. This remarkable view embraces a large portion of Wyoming, Montana, Idaho and Utah territories. To the east we can see distinctly the Wind river and Big Horn ranges, with the snow-clad summits of Fremont, Union and Cloud peaks; on the north the Yellowstone range, with Emigrant peak, and many of the loftiest mountains in Montana; while to the west the numerous ranges comprised in what is known as Salmon River Mountains of Idaho bound the horizon; and to the south, in the Snake river valley, the vast range of the Tetons send their shark-tooth summits above the clouds, white with perpetual snows. We might linger here for hours, describing to you the varied and remarkable scenery of this unique region, but we will hasten over the water divide to the westward and descend into the source of the Madison. Here are located the two great Geyser basins of the world. In the upper Geyser basin are about fifty first-class spouters, any one of which would equal the far-famed Geyser of Iceland. The two basins are situated in the valley of a branch of the Madison, called Fire Hole river, a suggestive name. The two basins are about ten miles in length and a mile in width, on an average, with an interval of about two miles separating the basins. Within this area there are hardly less than 3,000 to 5,000 springs of all kinds. The valley is walled in with volcanic mountains rising fifteen hundred feet or more. Mr. Jackson, the photographer of the expedition, secured fine views of some of the most important geysers, some of which we have the pleasure of showing you this evening. Only one of them was taken while in action, and this was "Old Faithful." This geyser is located on a hill, at the very head of the valley, and has received its name from its fidelity to its periods of action, never failing to act once in sixty or sixty-five minutes through the twenty-four hours of the day and night. The commencement of the outburst is foretold by a rumbling noise beneath the crust, and then a column of water, six feet in diameter, is held up one hundred to one hundred and fifty feet for about five minutes. Time will not permit me to describe in detail the wonderful ornamentation around the springs, produced by the silicious deposits, nor the remarkable transparency of the waters in the calm springs, where all the colors of the rainbow are produced. Then there are the mud-springs, one

of which has a diameter of forty feet, and is constantly throwing up particles of silicious clay, fine enough, it would seem, for the manufacture of the finest ware. We might call attention to the remarkable cañon of the Madison, where the river rushes down between walls of basalt fifteen hundred feet high, and the unique terraces on the lower Madison Valley, but they must be seen by the traveler to be thoroughly appreciated. The peculiar beauty of this kind of wonderful scenery is its great variety. We pass from one unique scene to another, until the mind almost wearies with the marvelous as well as the picturesque. Before leaving this strange land, I beg to call your attention to one more interesting geographical point. You will see on the little map that is thrown on the screen, that at the head of Henry's Fork of Snake river, there are four remarkable passes or depressions in the great water divide or crest of the Rocky mountains. These passes may be regarded as representing the four points of the compass, and may be called the great gateways of the continent. The Reynolds, or North pass, leads into the lower Madison through a smooth, grassy valley, only six thousand nine hundred and eleven feet above the sea; the Tygee, or East pass, seven thousand and sixty-three feet, opens into the upper Madison, and thence to its source; the West, or Red Rock pass, seven thousand two hundred and seventy-one feet, connects the great valley of the Jefferson Fork with the Snake River Valley; while the South, or Henry's pass, six thousand four hundred and forty-three feet, connects all the others with the interior of the continent and the Pacific coast. The surface is so smooth in all these passes, that one may ride from the Pacific slope to the Atlantic in a coach and four at full speed. In a practical point of view, these passes will be of the utmost importance. The great valley of Snake river is very fertile, and may be made available for settlement at once; and the pine forests, which are almost unlimited in extent, might be utilized by means of railroads for the benefit of the almost treeless interior, of which Salt Lake basin is a part.

I have been able in this rapid journey to present only a mere glimpse of the remarkable scenery and striking geographical features of this wonderful region. We will now return to Colorado. The north line of the Territory lies along the parallel of forty-one degrees; the east line along the meridian of one hundred and two degrees; the south line on the parallel of thirty-seven degrees; and the west line along the meridian of one hundred and nine degrees. Within these limits are some of the most remarkable ranges of mountains on the continent. The Colorado, or Fort range on the east, the

Park range, the great Sawatch range—usually called the Sierra Madre, or Mother range, from the fact that it is the backbone or water-shed of the continent; the Elk mountains, farther westward, terribly rugged, with numerous sharp-pointed peaks rising over fourteen thousand feet. From the summits of the high peaks of any of these ranges, a perfect wilderness of mountain summits is embraced within the scope of the vision. Well may Colorado be called the "Switzerland of America," except that the immense glacial masses have passed away. In Switzerland a half dozen or so of peaks, rising to fourteen thousand feet, may be seen, while from the summit of Mount Lincoln in the South park, which is itself fourteen thousand and one hundred and eighty-three feet above the sea, may be seen at least fifty summits rising from thirteen thousand to fourteen thousand feet and upwards. You will see by the illustrations thrown upon the screen, how the mountains extend from east to westward, range after range, like sea waves. The general elevation of the surface is from six thousand to ten thousand feet above sea level. The village of Fairplay, in the South park, is nine thousand seven hundred and sixty-four feet. Let us for a moment suppose ourselves at Denver, a city in the plains, about twelve miles east of the base of the Colorado mountains, but so near that the eye can take in this general range from Long's peak at the north to Pike's peak at the south, a distance of about one hundred miles. Denver is a little over five thousand feet in elevation. Looking to the west from Denver, when the atmosphere is clear, the immense massive Front range seems to rise suddenly out of the plains with such proportions, that it appears to dwarf all others that we have ever seen, when contrasted with the broad level plain. To the north, Long's peak rises to the height of fourteen thousand one hundred and fifty feet, towering high above the surrounding mountains; the snows that cap its summit giving birth to streams that flow westward into the Pacific and eastward into the Atlantic. It may always be known by its summit being divided into two sharp crests, the western one being the highest. The rocks are granite schists. About twelve miles to the north-west, is a beautiful park four by six miles in diameter—one of the most beautiful watering places for invalids and pleasure-seekers in Colorado. The little Thompson creek, which rises in Long's peak, and flows through the middle of Estes park, is filled with trout. These little parks are so close to the high ranges, and are so sheltered, that they form fine pasture grounds for herds of stock. As we look southward, Audubon, Parry's, James', Torrey's, Grays', Evans', Rosa, and far south Pike's peak, all rising over thir-

teen thousand, and most of them over fourteen thousand feet. Patches of snow are always seen above timber line, which is there about eleven thousand feet. Along the eastern base of the front range are a series of singular uplifted ridges, usually called "Hog Backs," which are oftentimes weathered into remarkably unique forms. These ridges are the upturned edges of the entire group of the sedimentary rocks known in this region from the Silurian to the Tertiary inclusive, which, prior to the elevation of the mountain ranges, extended uninterruptedly across the area now occupied by them. They have been brought to the surface by the upheaval of the great granite nucleus. The "Garden of the Gods," near the east base of Pike's peak, is formed by the weathering of the red Triassic sandstone into singular forms. There is an opening through one of the nearly vertical ridges called the "Gateway to the Garden," through which Pike's peak, with the intervening lower ranges, are distinctly seen. On the summit of Pike's peak the Signal Service Bureau has established a station, and weather reports, from an elevation of thirteen thousand nine hundred and eighty-five feet, are transmitted daily to the office at Washington. Monument park is another interesting locality near Colorado Springs, where the Tertiary sandstones have been worn by atmospheric agencies into curious columns, capped with a brown, hard mass of rusty iron stone. The illustration will show to the eye, more clearly than any description, the variety of forms these rocks assume. Although these massive ranges of mountains seem to the eye at a distance to be almost inaccessible, yet there are roads winding about among them in every direction. Ranches, and even little thriving mining villages, are hidden away in the little sheltered parks walled in by the high mountain peaks and ridges. Let us enter the mountains by one of these roads which follows up the cañon of Clear creek to Georgetown, a little village of about two thousand inhabitants, built up by the silver mining interests in the vicinity. If we follow the same stream twelve miles farther, we shall reach its source at the east base of Gray's and Torrey's peaks. We may follow a well-trodden path on foot or on horseback to the summit of Gray's peak, fourteen thousand two hundred and fifty-four feet above the sea. Separated from Gray's peak to the north by a saddle, about a mile distant is Torrey's peak, fourteen thousand two hundred and forty-nine feet. These splendid peaks were so named by Dr. Parry, several years ago, in honor of the two great American botanists — co-workers in the same branch of science for so many years. There is only five feet difference in the heights of the peaks. There seems to have been a beau-

tiful fitness in attaching these names to these two peaks, and they will ever remain enduring monuments to their fame.

From the summit of Gray's peak we can embrace a large portion of the mountain region of Colorado, within the horizon of vision. The splendid parks — North, Middle and South parks — are spread out to view. These great parks are really depressions underlaid with the sedimentary beds, but surrounded on all sides by high ranges of mountains. South park is about thirty miles in diameter from north to south. The drainage is entirely from north-west to south-east and east. The general elevation of the park is from nine thousand to ten thousand feet, and, on this account, while the broad, level basin in midsummer is covered with high grass like a meadow, the climate will always be too severe for the successful cultivation of crops of any kind. The Middle park, which lies directly north of the South park, is far more complicated in its structure. It is really composed of a number of small parks, which were, in comparatively modern times, geographically speaking, fresh water lake basins, the old lake deposits still remaining to reveal the history of the later physical changes. The general level of this park is greater than that of the plains to the eastward of the mountain ranges. Still the sedimentary groups of strata are the same. They shared in what may be called the general elevation, but the great lines of fracture of the earth's crust are those along which the most powerful forces acted. To the eastward from Gray's peak we can look off on to the plains, our vision only limited by the horizon. To the north we take in the splendid line of snow-covered peaks of the Colorado range; to the west and south-west the mountain of the Holy Cross and the lofty peaks of the Park range. If we were to describe all the interesting localities in detail, which come within the circle of our vision from a single peak, it would occupy the entire evening. We may look down the valley of Clear creek, which rises at our feet, and we shall see one of the most active mining districts of the West. The mountains are veined, like the human body, with silver, and on the almost vertical sides, sometimes 1,500 feet above the valley below, may be seen the miners' houses spiked on to the granite rocks. Tunnels have been partially completed through many of the mountains, and excavations from base to summit are so numerous that, to compare great things to small, we might be reminded of the burrowing of squirrels. Beautiful lakelets meet the eye on every side, sometimes far up above timber line. Perhaps the most picturesque lake in Colorado is the one that lies at the foot of Mount Rosalie and forms the source of Chicago creek. It is a favorite place of resort for visitors and especially artists. A dozen or more

of these little lakelets may be seen from this point, lying at different elevations. The great peaks usually lie along a certain line or axis, which forms a water divide. On either side of this water divide are huge amphitheaters, in which are accumulated great bodies of snow, which, during the summer, are continually melting, filling up the little lakelets or reservoirs below. All the myriad branches of our mountain streams rise in an amphitheater, and in almost all cases have their immediate sources in one of these little emerald-green lakes. These amphitheaters are formed by the constant tendency of the elements for ages past to excavate toward this mountain crest or divide. Water and ice have been the great agents. The water from the melting snow accumulates in the fissure of the rocks, and freezing, pushes off, by expansion, layer after layer, until the sides of the mountains for miles are covered with the *débris*. In many instances the crest has been, as it were, eaten through, so that low saddles or passes are formed. The great work of destruction, or the leveling down of these mountains, has been going on for infinite ages, and although in past time the destructive forces were vastly more effective, yet the slow process still goes on. The highest ranges have felt most the power of those eroding forces. This is what may be called "earth sculpture," and it is to the marvelous skill of nature in this, her artistic work, that the picturesque scenery of the Rocky mountains is due.

There are some quite remarkable forms among these amphitheaters, and we may mention the "Horse Shoe" in the Park range, which has been slowly excavated for at least five miles back from the plains, to the very crest of the divide. The Park range forms the west wall of the South park, and its axis trends about north-west and south-east. In what is called the Mount Lincoln group are six peaks that may be ranked in the first class, three of which are respectively 14,183, 14,047 and 14,055 feet, viz.: Lincoln, Quandary and an unnamed peak, and Buckskin and "Horse Shoe" peaks, 13,951 and 13,780 feet in height. These mountains are covered with silver mines. On the summit of Mount Lincoln, one of the most valuable mines in that district, with all the necessary buildings, is located within one hundred and fifty feet of the top. A road has been made to this mine. Many of the high mountains, instead of sharp angular crests and ridges, are covered with a heavy bed of soil, so that their forms are smoothed and rounded, and covered in many cases with herbaceous vegetation far above timber line. For fifteen hundred feet above timber line on Mount Lincoln and the surrounding peaks, there is in July and August a thick mass of beautiful spring flowers of great variety and hue. It is very seldom that so fine a

floral exhibition can be found in lower and more favored regions. Many of these beds of flowers are surrounded with perpetual snows. Just west of the Park range is the great Sawatch range, the Sierra Madre or "Mother range" of the continent, with a trend about north-west and south-east, and with a length of sixty to eighty miles, literally bristling with sharp peaks the entire distance, ranging from 12,000 to 14,000 feet and upwards. Between the Park range and the great Sawatch lies the Arkansas Valley, which in some respects is the most instructive in Colorado. Near the north end of the Park range is a modest mountain peak called "Triaqua," from the fact that it gives rise to three important streams. The Blue river, that flows northward from it, and trending toward the west, unites with the Grand or Gunnison river, and finally joins the great Colorado.

The Arkansas, which flows south from this peak about fifty miles, and then bends to the east, cuts through the mountains and opens into the plains; also the South Platte, which flows to the south-east, across the South park, and suddenly bends around to the north-east, cuts a deep cañon through the Colorado or Front range, and opens into the plains south of Denver. Let us now for a moment take a rapid glance at the principal features of the Sawatch mountains, one of the grandest ranges in America. Let us suppose ourselves standing upon the summits of one of the high peaks of the park, say Mount Lincoln. As we look westward, the sharp crests of the numerous lofty peaks are set like a forest along a belt of fifty miles or more in length, and about twenty miles in breadth. To the south we see the lofty summits of Harvard, Yale and Princeton, respectively 14,270, 14,041, 14,057 feet high, all surrounded by groups of peaks from 12,000 to 13,000 feet and upwards. To the northward is Elbert peak and Massive mountain, each over 14,000 feet. In this range we measured several peaks which reached an elevation of over 14,000 feet, while those of 12,000 and 13,000 feet and upwards were almost without number. At the extreme northern end of the Sawatch range is one of the most remarkable groups in the West, which we have called the Holy Cross group, the central peak of which is called the "Mount of the Holy Cross." In the topographical survey of Colorado during the past summer, this peak was made one of our most important stations, and was therefore carefully measured. It did not prove to be as high as we had expected, being only 13,540 feet, while we were led to believe, from its location on all existing maps, that it was probably 15,000 feet or more. We found it to be some thirty miles out of place. The difficulties which we encountered in the exploration of this interesting region will always prove an

era in the history of the survey. To reach this peak we ascended the Arkansas Valley, and crossed the water-shed at Tennessee Pass, descended Eagle river over one of the most rugged districts we have ever seen in the West, until we came to the mouth of Roche Montonne creek, a small stream which rises on the north side of the group, and flows to the east of north about ten or twelve miles, when it joins Eagle river. The valley of this stream is a vast glacial trough filled with rounded masses of granite, which are called, in the Alpine regions of Europe, *Roche Montonne*, or "Sheep Backs," varying in length from a few feet to several hundred, and crowded as thickly as possible. The sides of the mountain, for 1,500 feet in height, show the intensity of the glacial erosion. Much of the surface of these worn granites is now covered with a sort of smooth enamel which might be called a glacial crust. Among these rocks there is a perfect network of fallen timber, which renders traveling next to an impossibility. The autumnal fires have swept through the pine forests, and then the winter and spring winds have prostrated them in every direction. We could not reach the mountain with our animals within five miles, so that all the apparatus for triangulation and photography had to be carried by hand across five miles of rugged rocks and fallen timber before we began the ascent. Messrs. Gardner and Jackson were thirty-six hours without food or shelter in ascending the peak, and performing the necessary work from its summit. The views of the Holy Cross, which I present to you to-night, were taken from a ridge opposite, about a mile distant, 13,000 feet above the sea. The cross is formed by the snow filling up the huge cross fractures in the granitic mass. The vertical fissure is about 1,500 feet long, while the horizontal one is about 800 or 900 feet. At the time the picture was taken in August, much of the snow had melted out of the fissures, so that it is not quite so conspicuous as in the early spring or autumn. Before leaving the Sawatch mountains, I must call your attention to the wonderful moraines that occur on either side of the range.

The valley of the Upper Arkansas for fifty miles on the east of the range, and the valley of Taylor's creek on the west side, were once the seat of enormous glaciers, filling up the valleys and extending up the side cañons far up to the very crests of the mountains. The Twin lakes are glacial basins surrounded by moraines. The two lakes, which are only a few hundred yards apart, are separated by morainal bridges. These beautiful lakes are located close to the base of the mountain between two high morainal ridges 700 to 800 feet high. The upper one is about one and a half miles in diameter and eighty

feet deep. The lower one is about three miles long and is seventy-six feet in depth. In the valley of Clear creek the moraines on either side rise 700 feet, and look so regular that they have the appearance of huge railway embankments. In the deep cañons, which have been carved out of the mountains up to the very crests, marks of the glacier may be seen for 1,500 feet in height. So far as the structure of this mountain region is concerned, we may say, in general terms, that the great Sawatch range forms the central granitic nucleus of a grand anticlinal, with the Arkansas Valley on the east side and Taylor's Valley on the west, as monoclinical depressions, and the Park range on the east side of the Arkansas Valley as one of the subordinate ridges inclining toward the east from the central axis, while far west of the main range the sedimentary rocks incline in the opposite direction; therefore both the valleys of the Arkansas and Taylor's river are partially the result of erosion and partially of original fracture in the uplift of the great granitic axis. I will call your attention to but one more range of mountains; this is the Elk range, still farther to the west, in the drainage that leads to the great Colorado of the West. This range is about fifty miles in length and differs from any of the others in its form and structure. In this range are seven or more peaks of the first order, rising to an elevation of nearly 14,000 feet, and many others ranging from 12,000 to 13,000 feet and upwards. But it is the peculiar geological structure of this Elk range that attracted our attention more especially. It would seem that at one period the great group of sedimentary rocks, comprising many thousands of feet in thickness, rested on a floor of igneous granite, in a pasty or semi pasty condition, and that these high peaks of granite were thrust through these overlying strata, in many instances completely overturning them, so that there are two series in contact. A series underneath, rising layer by layer in regular order, from the silurian to the cretaceous inclusive, and then the series reversed, with the silurian on the summits. This complete overturning of the entire sedimentary group continues for ten or fifteen miles without interruption. Sometimes the sedimentary beds are lifted up at great elevation from the summits of the highest peaks, with portions faulted down in the lowest gorges, so that corresponding portions are broken off, producing faults of 2,000 feet or more. Deep gorges and amphitheatres meet the eye on every side. Snow Mass mountain, 13,853 feet above the sea, is so called from the immense mass of snow which ever lies on its sides, rendering it conspicuous at a great distance; and at its immediate level, on all sides, are nestled beautiful lakes which receive the waters from the melting snows. No

one can convey to you the marvelous ruggedness of the surface. As far as the eye can reach, on every side, may be seen high mountain peaks with deep gorges in one continuous succession, while the sedimentary rocks are thrown into utter chaos. The survey under my charge during the past summer measured seventeen peaks in Colorado which reached an elevation over 14,000 feet, and twenty-seven over 13,000 feet, and an almost indefinite number rising above 12,000. There can hardly be less than twenty-five peaks in Colorado that rise above 14,000 feet, and thirty or more that are over 13,000 feet in height, so that Colorado may well claim to be the mountain region of America. I might dwell for hours on the details of the remarkable geographical features of this wonderful country, but I have already prolonged this lecture beyond the usual time. If the surveys which have been inaugurated by our Government are permitted to continue, we may annually look for fresh and most valuable additions to our knowledge of the geology and geography of the little-explored portions of our great West. May the united voice of the people go up to our legislators in Congress, and sustain them in their efforts to continue them, until it shall not be thrown up to us as a matter of reproach that even Central Africa is better known to geographers than our own great West.

Prof. Theodore W. Dwight moved that a hearty vote of thanks be given to Dr. Hayden for his valuable and instructive paper.

Unanimously adopted.

VII.

THE MISTI, AND TRAVELS IN PERU AND CHILI.

BY LIEUT. H. C. COCHRANE.

A large gathering of the Fellows was present at the closing meeting of the session of 1873-4, on the evening of May 7th, at Association Hall. Col. Frederick A. Conkling, Vice-President, called the Society to order, and introduced Lieut. Henry Clay Cochrane, of the U. S. Marine Corps, who advanced, holding in one hand a small roll of papers, and spoke in substance as follows:

MR. PRESIDENT, FELLOWS OF THE AMERICAN GEOGRAPHICAL SOCIETY, LADIES AND GENTLEMEN:—Fortunately for you, but very unfortunately for me, the special messenger, to whom was intrusted the delivery of this package, containing my precious manuscript, much "spread-eagle," and many statistics, failed to get it to me until this moment. It was due at 5 p. m., and anxiously expected; but when 7 o'clock came and it had not arrived, I abandoned hope, and in a fit of ungovernable fury, which, you will observe, still continues (laughter), determined that I did not want it,—in fact, would not use it if it should come. This decision involved a change of programme. So, instead of attempting to electrify you with rehearsed eloquence, or petrify you with scientific facts, I propose simply to have an informal "talk," and to try to entertain you as though you were my guests in a parlor or drawing room, by showing you some stereopticon views, relating some incidents of travel in Peru and Chili, and so much of the contents of this delinquent manuscript as I may happen to remember. We will now discard it, "spread-eagle" and all (threw to one side), and, in imitation of our worthy legislators at Washington, enter a motion for "leave to print." (Applause.) By granting this, you will do yourselves a great favor, for when it appears in the next bulletin of the Society, its reading will be

optional; but if, on the other hand, I were to read it now, the affliction could not well be escaped, and might prove "too grievous to be borne." (Renewed laughter and applause.)

The speaker then, being in sympathy with his audience, related several anecdotes *apropos* of his disappointment, and invited the large assembly to accompany him upon an imaginary tour to the Southern Hemisphere. The room was darkened for the exhibition of the stereopticon views, a Pacific Mail steamer called into requisition, and a rapid voyage made to Aspinwall. The gulf stream, the Bahamas, Cuba, the point of the *Virginus* capture, the landing at Kingston, Jamaica, and transit of the Caribbean sea, were incidentally sketched, the Isthmus of Panama crossed, and the point designated where the great South sea was first beheld by the adventurous Balboa, in 1513. Christopher Columbus was referred to as the great geographer who first began our records in 1492, and the fact presented that in Central and South America his memory is held in much greater estimation than here. Numerous mountains, towns, statues and hotels named *Colon* attest this.* The intimate relation existing between insurance and modern commercial decay, as shown in the destruction by fire of falling cities, was illustrated by the fate of Panama, and after a description of the natural history and commercial uses of its beautiful bay, the journey was continued by embarking upon one of the steamers of the great English Coast Line for the South. The United States of Columbia were instanced as having at last awakened to the value of light-houses, and being now engaged in efforts to establish them. Guayaquil was visited, its importance as the seaport of Ecuador and the head-quarters of the Cacao, Caoutchouc and Cinchona trade set forth, and the very interesting remark made that from its roadstead, upon a clear morning, can be seen, at a distance of one hundred miles, glistening like burnished silver in the new-born sun, the snow-clad summit of hoary old Chimborazo, pronounced by Humboldt "the grandest mountain in the world." The line of demarcation between the rainless region and the tropical deluges was placed near Tumbes, Peru. Payta, Chimbote and the guano islands were described, and at Callao another transfer made to reach Islay and Mollendo, the *embarcaderos* of Arequipa. The present and the old method of reaching Arequipa, the one by comfortable American cars, the other by mule train across the arid pampas, were shown by admirable views; and after a preliminary description of the plain of Quilca and the city of Arequipa, the event of the

* Christoval Colon is the Spanish equivalent,

evening—"THE FIRST ASCENT OF THE MISTI"—was reached. This ascent was made last fall, by Dr. Isaac T. Coates, of Chester, Pennsylvania, at present medical director of the Chimbote and Huaraz railroad, in Peru. During intervals of much-needed rest from his arduous professional labors, the doctor amuses himself by plunging into the gorges of the Andes; and one of his excursions resulted in his achieving what no man with sufficient intelligence to record it had ever done, and that is, the summit of the famous Misti. Dr. Coates, being unable to be present, communicated his narrative to Lieut. Cochrane as his "next friend," and through him it is presented to the Society as a contribution to Andean geography.

THE FIRST ASCENT OF THE "MISTI."

"Above me are the Alps,
The palaces of Nature, whose vast walls
Have pinnacled in clouds their snowy scalps,
And thron'd eternity in icy halls
Of cold sublimity, where forms and falls
The avalanche—the thunderbolt of snow!—
All that expands the spirit, yet appals,
Gather around these summits, as to show
How earth may pierce to Heaven, yet leave vain man below."

BYRON.

Having a veneration for every thing great and sublime in nature, it can surprise no one that I should have had a desire to ascend the world-famous Arequipa volcano. I remember how, years ago, when a school-boy, I read with feelings of mingled pleasure and awe, of this and other burning mountains; and how the promptings of an instinctive love of travel, led me to dream and to hope, that one day my eyes might behold what the imagination then only painted to my youthful mind.

I therefore felicitate myself on the opportunity recently afforded me of making the acquaintance of the Misti. For this, I am mainly indebted to Mr. John Campbell, *Contractista* of Arequipa, whose guest I had the honor to be during my late visit to that city. Mr. Campbell secured my troop, as sure-footed, honest mules as ever carried a pack, and offered me every thing but himself for the journey. Mrs. Campbell, his good wife, saw that I should not go hungry, and Mr. E. A. Flint, one of the civil engineers of the Arequipa railroad, procured the necessary guides, and a *companero* (companion) for me. This *companero* was Señor Don Manuel Zoriano, a perfect Hercules of a Spaniard from Salamanca. He was, moreover, a man of some learning, being familiar with Latin, and able to speak fluently French and Italian, in addition to his native tongue.

I left Arequipa on the 22d of September, 1873, at 10 A. M., and, after as many accidents and detentions—inseparable from guides and *arrieros* (muleteers)—as would befall a ship on a long and dangerous voyage, reached the foot of the great mountain with which I was to grapple the next morning, and laid me down to sleep, and gather strength for the unwonted task. To this point from Arequipa is thirty miles in a north-easterly direction, though it would be difficult to convince a person unaccustomed to estimating distances in this mountainous region, so clear is the air, that it is more than a league.

After a fair night's rest, I anticipated the sun in his rising, and full of the spirit of contention and ambition to conquer, stood before my gigantic opponent, as David stood before Goliath—and challenged him.

At 7:40 A. M., accompanied by three guides and an *arriero*, and provided with two aneroid barometers, one a small, but very valuable one, in a gold hunting case like a watch, and the other a compound affair without a case, but combining a compass and thermometer, we started for the summit, or so far as we could get without seriously imperiling our lives. For the first hour and twenty minutes, the ascent was made on mule back, but at this point the way became so steep, that the animals were unable to climb farther, and we were obliged to dismount and proceed on foot.

It was then nine o'clock. I made my bow to the summit, which was apparently so near that I thought surely an hour or two more would see me at the coveted point. Our course lay up the ancient lava bed on the west side. The sand was fine and yielding. At every step I went in ankle-deep, and slid back half the distance taken. The guides walked away as if on a hard road—such power hath custom—while I soon found myself not only tired, but every few minutes falling to the earth from pure exhaustion. By the watch I found each advance—from 30 to 50 feet—to last just one minute, and the necessary rest following to be from three to five minutes. Creeping along in this way a full hour passed, and I seemed scarcely to have left the starting point. At the fourth hour we gained a rocky ridge, and leaving the sandy course to follow the guides, toiled up this. Here were ledges of rock, terraced rock, and rock piled in confused heaps as if just blasted from the quarry. The terraced rock often formed dangerous precipices, up whose stony way we clambered, where the sure-footed goat, or the vicuña, could not have gone. This dangerous part of the ascent lasted five hours.

When about three-fourths of the way up, Señor Zoriano gave out and was left behind. Another of my companions, an old man, gave

out when about one thousand feet from the top, and the other two had to be paid five *soles* (Peruvian dollars) each additional, to go on with me the last stretch, for night, and storm, and darkness were coming on.

At 5:10 P. M., after the most exhausting exertion, and suffering from the terrible demands of hunger and thirst, the goal seemed within my grasp. Deeming the victory too easy, I had neglected to supply my pockets with food, and the guides, in whose keeping I had placed the water, had drank it early in the day.

At precisely 5:30 P. M., after sweating, and grunting, and panting, and palpitating for nearly ten hours, I stood within the crater where "the red and awful tide" had once bubbled up and boiled over, inhaling the pure and refreshing breezes that play about the summit, and lording it, as it were, over the Arequipa volcano. And as I stood upon the highest pinnacle of this grand eminence, disputing with the condor the possession of his aerial throne, and waving the "stars and stripes" three miles and a half above the Pacific ocean, over whose aquatic plain my eyes peered at the distance of one hundred miles, I confess to a momentary feeling of pride and exultation when I thought that, perhaps, I had carried the flag of my country to a loftier region than it had ever before been carried, — more than six hundred feet above the highest point of land in North America, the land that gave it birth, and more than one thousand feet higher than would be far-famed Vesuvius if piled upon the top of Fremont's peak. But those American demi-gods, who a few years since went down to death for this flag, planted theirs upon a height which dwarfs this physical elevation. I left my flag for the eye of the condor of the Andes; they planted theirs upon a moral Himalaya where all the nations of the earth can see it. If the United States of America shall ever forget to love, honor, and cherish their names with the fondness of a young mother for her first born, it can only be when a political apoplexy — from whatever cause — shall have paralyzed the heart of our great country; when the voice of the Moses of nations, speaking to all the world as the American Union speaks to-day — with the authority of Israel's Chief from Sinai — shall be as mute as the dumb mouth of the extinct volcano in which I stood when these thoughts, unbidden, inspired by the freedom, grandeur, and omnipotence of nature that surrounded me, forced themselves upon my mind. But I am weaving the woof of patriotism into the warp of science, for which offense, if offense it be, I can only plead that insubordination of mind which is superinduced by contact with these vast, eternal temples of nature.

It might very naturally be supposed that upon attaining so quickly such a great elevation, the mind would be overwhelmed with the awful sublimity of the prospect ; but such was not the case, and Byron well explains the reason in describing the effect produced upon one who enters the Cathedral of St. Peter at Rome, when he says :—

“ Enter ; its grandeur overwhelms thee not ;
And why ? It is not lessened ; but thy mind,
Expanded by the genius of the spot,
Has grown colossal.”

It was a rare sight—I may say a dearly-earned sight—to look down upon the world below me. A universe seemed to be spread out at my feet. Two miles under my perch to the westward was the plain of Quilca and the City of Arequipa. Lake Salinas, fourteen or fifteen thousand feet above the level of the sea, but still several thousand feet below me, bore east by south, and the volcano Ubina, sending forth volumes of smoke, bore east by north. I could see the cars winding their tortuous course along the distant rugged mountain's side on the route to and from Puno on the shores of Lake Titicaca, the highest navigable water (12,350 ft.) on the globe. What a speck is man, thought I, beside the mountain ; yet he triumphs over it, as the viewless winds over the mighty forests. With an ambition and an energy that might mock the gods, he tears the granite crest from its imperial head, disembowels it, overcomes it, subdues it, sends the iron horse with the voice of thunder and speed of lightning, like an omnipotent messenger, from its base to its very summit.

Wonderful is his skill and ingenuity ! and these are the specimens of his handiwork which exhibit him in his greatest greatness. These are the works which show in their true light the grandest conceptions and most Herculean executions of the human mind, and demonstrate its god-like nature.

Sir Christopher Wren, standing beneath the dome of St. Paul's, his honest heart swelling with proud emotion, said : “ If you seek my monument, look around you ; ” and so may those daring American engineers who have come to this land of the Chimoos, and of the Incas, and of the Spaniards, and built these great iron highways among the lofty domes of the Andes, stand upon their highest level and say : “ If you seek *our* monument, look around you.” Long after Saint Paul's is in ruins, and has been sketched by Macaulay's New Zealand Traveler, these evidences of American genius will stand to record for the most remote posterity its achievements in this extraordinary country. With the names of Henry and John G. Meiggs,

the leaders, may well be coupled those of John Campbell and John L. Thorndike, their efficient aids.

But my sight-seeing was of short duration. A furious snow storm and tempest of wind set in soon after my arrival and put an end to all thought of a protracted stay. There was neither thunder nor lightning, but there was something truly terrifying in the loud voice and fury of the mad winds warring with the rock-crowned head of the Misti. Now and then the gale would die away and a solemn silence succeed—a silence so intense that nothing could be heard save the beating of one's own heart. Presently a low, melancholy wind, indescribable and unearthly, would glide into the crater with a subdued, sad moan, as if the Genius of Death had heaved a sigh.

I found the Misti, heretofore supposed and always stated to be a burning volcano, cold and *without indication of recent eruption*. The appearance of smoking, which its summit often presents to the people of the plain, is an optical delusion produced by feathery clouds. The crater is elliptical and I judge to be about three hundred feet, by from six hundred to eight hundred feet in diameter, and its mouth (or what had been its mouth) is completely closed by black sand and black pebbles. The concave is very shallow and resembles a pie dish. Seven-eighths of the crater is surrounded by a rocky wall from one hundred to three hundred feet high. Quantities of sulphur, specimens of which I brought away, are clinging to these rocks within and without, and send their strong fumes fully one thousand feet down the mountain's side. To the east and to the west the lava has found its outlets in two distinct beds. I would recommend the east lava bed all the way up to the crater as decidedly easier and less dangerous for ascent, than the perilous rocky route over which the guides took me. The descent was made by this course in about two hours—from six to eight o'clock. It was so steep that, sitting on the sand, I was enabled with very little motion to slide down more than half the distance, at the expense of a new pair of pantaloons.

During the journey I saw no living thing, not even a lizard; no bird chirped, and no insect buzzed or wheeled its busy flight through the thin air. Only the tinkling music of the bells on the llamas in the valley, two miles or more away, softened the mournful sound of the winds about the mountain top. When fifty-eight feet below the summit, I had reached the point of atmospheric equipoise, the three and a half miles below me weighing exactly as much as the forty-one and a half above; yet I felt no symptom of the *soroche*, no bleeding at the nose, eyes or ears, no suffocative asthma; so I had no chance to practice on myself my theory about *soroche*, to supply the absence

of atmospheric pressure, as the surgeon does to the dropsical patient he taps, nor to open a vein in the arm to relieve the bleeding from the organs of the head. I should treat *soroche* on the plainest principles of hydraulics.

My friend, Dr. Thos. J. Hutchinson, F. R. G. S., and H. B. M. Consul at Callao, in speaking of *soroche* says, parenthetically, that it is "a congestion of the lungs;" but the learned gentleman could not have reflected upon the full pathological signification of that sentence, or he would not have written it, for *soroche* is, in no sense, a congestion of any organ; *it is simply a want of blood at the brain.*

From Humboldt down, indeed, so far as I know, no traveler, ancient or modern, has advanced any positive theory on the subject of *soroche*, and if what I have recorded above be original with myself, I shall not hurry to the Patent Office with it, nor shall I experience any pleasure or satisfaction from it beyond its practicability, should it be found to possess any, for the general good and advancement of science. *Soroche* is a Quichua word (Quichua was the polished Inca language) and means "being able to subdue." It is universally used in this country to express that sense of oppression from difficulty in breathing, together with nausea, pain, tightness and fullness of the head, bleeding at the nose, eyes, ears and mouth, which is almost invariably experienced by those who venture into high altitudes, from ten thousand feet upwards. The invisible subjugating spirit—an omnipotent one—is, of course, the rarefied air.

Humboldt and his friend, Dr. Bonpland, suffered terribly from this in their attempted ascent of Chimborazo, and bled copiously from their eyes, lips and gums; yet they were but 741 feet higher than the elevation I reached, at the crater of the Misti, without feeling any thing of this sensation. My compañero, Zoriano, on the contrary, a man of immense strength, was most severely affected by it, and, as I have already stated, gave out completely when three-fourths of the way up the mountain.

He suffered from pain, fullness and tightness of the head, great nausea and faintness, but had no exudation of blood from the organs of the head. The *soroche* subjugated him, and left him on the earth manacled with weakness. Neither the odor of onions, garlic nor ammonia, the common remedies in use, gave him any relief. I should have experimented on him with my theory of *soroche*, but to have lost time in delay would have precluded an investigation of the phrenology of the Misti for *that* day, as it was then growing late.

At the start he walked rapidly away from me, and looking back now and then, would ask with a pleasant smile: *Que esta usted*

haciendo abajo de alla? (What are you doing down there?) But after the first quarter I gained on him, overtook him half way up, and bade him *Adios* at the third quarter, making the fourth alone, which I did much more easily than the first. Zoriano was a young man, at least ten years my junior, in perfect health, about five feet eight inches in height, and weighed about 190 pounds. My height is five feet ten and a half inches, and I weighed then 145 pounds, which was from five to eight pounds less than usual. I was completely worn out by recent protracted and arduous professional labors, from which I was seeking repose, and the day and night previous to making the ascent had a rather severe bilious attack. Thus it appears that "the battle is not always to the strong, nor the race to the swift."

Notwithstanding my exceedingly exhausted condition on reaching the little hut at the foot of the mountain that evening (for besides the physical exertion, I had been without eating or drinking for twelve hours), I was up next morning at two, and had ridden to Arequipa, thirty miles, by seven o'clock.

Gratified and encouraged by the discovery of this unsuspected capacity for mountain work, and especially by the immunity from the *soroche*, I have determined, so soon as I can command the time, to attempt Chimborazo. The altitude attained by Humboldt on that mountain, 19,279 feet above the sea, was then, June 23, 1802, the highest ever reached by man, although nearly thirty years later, December 16, 1831, it was exceeded on the same mountain by the French naturalist, Boussingault, who, accompanied by Col. Hall, an English friend, claimed to have registered 6,004 meters, or 19,693 feet, which would make a difference in their favor of 414 feet. Since then, the wonderful achievements of the Schlagintweit brothers among the Himalayas have demonstrated the possibility of climbing nearly a thousand feet higher than the summit of Chimborazo, under certain favorable conditions. August 19, 1855, Robert Schlagintweit attained on Ibi Gamin the extraordinary elevation of 22,259 feet, the greatest height reached by man without the aid of balloons, and perhaps only surpassed in a balloon by the famous ascent of Gay Lussac, who rose to 23,020 feet, September 16, 1804. To ascend 23,000 feet in one of the Himalayas would be, however, no greater victory than 20,000 in the Andes, for the superior stillness of the air among the former makes a difference of at least 3,000 feet in favor of the climber. Chimborazo is at times a perfect *Æolus*, the wind raging with such force that horses and riders have both been blown from their feet and over yawning precipices. Robert Schlagintweit

remarks that when sleeping in camp at great elevations, they would experience no serious inconvenience until the wind arose, when suffering immediately set in, and they would be aroused in the night by the *soroche*. He fixes the minimum elevation at which *soroche* is felt in the Himalayas at 16,500 feet, and says that camels and horses exhibited the symptoms and suffered at less than 17,500 feet. In the Andes we know that suffering has been experienced at 10,000 feet, and at 16,500 feet is oftentimes insupportable.

The exact cause of the failure of Humboldt to conquer Chimborazo seems difficult to determine. In his narrative he complains of fog and "the great tenuity of the air," and on one of his maps of altitudes it is noted that "a cleft in the mountain" arrested the ascent. Another account ascribes it to the snow, which is least likely, all things considered. From the fact that in May, 1802, he attempted the ascent of Cotopax, but thought better of it long before reaching the brink, it is inferable that the great traveler saw no charms in an existence attended with bleeding eyes and lips, with nausea and painful vomiting. Hassaurek, in his really excellent book on Ecuador, attributes the return to the fog. Whatever the cause, I have to record that I found no snow, except a little with ice in the chinks of the rocks at the crater of the Misti, 18,538 feet above the sea, and in lat. 17° south. The next morning, however, the mountain top was white with snow at least one-third of the way down. Certainly snow ought not to be found under the equator at a lower altitude than it is found 17° south of the line, and probably would not at the same season of the year. June is a winter month in the southern hemisphere, and it is strange that Humboldt should have selected it, as he was nine months in Quito, and several years in that portion of South America. Geographers claim that as we recede from the equator, the snow line tends regularly downward. In Peru it has been placed at 16,000 feet, and in Chile, at Copiapo, at 13,800, and at Valdivia at 8,300; but my experience is greatly at variance with this rule, unless the occasion was altogether exceptional.

Referring to the phenomenon known as *soroche*, I desire to say that in mentioning 10,000 feet as an elevation where it could be perceived, it was to establish a minimum. In the high Andean plateaus there live thousands of people who never visit the coast, and can know nothing of the sensations generally experienced by the lowlander, save what they may see. The city of Potosi, for instance, is 13,300 feet above the sea, the famous farm of Antisana is 13,455 feet, and in Peru I am told that there are human habitations as high as 15,720 feet.

The little smoke-enameled hut, without any chimney, in which I spent two nights, was 13,600 feet above the ocean, and yet I could sleep with much success. At another time, in going and returning from Puno, I slept at Vincocaya, on the Arequipa and Puno railroad, at an elevation of 14,538 feet, and a little beyond that station the iron horse canters over a ridge of 14,600 feet. When we remember that the boasted Union Pacific at its highest point is only 8,262 feet, we can better realize these altitudes.

Darwin the great disturber of metaphysical peace, says, that in Chile what I have described as *soroche* is called *puna*. In crossing the Portillo pass, he complained of short and difficult breathing and a slight tightness across the head and chest, such as is felt on leaving a warm room and running quickly in frosty weather. The natives, as usual, offered him onions and garlic, but he preferred the *puna*.

Marcy, who also intruded upon the condor, employs the term *soroche*, and attributes the symptoms to insufficiency of atmospheric pressure. He says the natives do not suffer, because they have lungs one-third larger than those of Europeans. They believe, or allege that they believe, that the feeling is occasioned by some mephitic gas produced by antimony, and chew the bulbs of garlic, as we do sugar plums, when they go far above their habitual level. Marcy declined the sugar plums, and was advised as the next best thing to knock his nose with his fist until it bled, and he would secure instant relief. He gives the symptoms as contraction of the diaphragm, dull pain in the dorsal region, shooting pains in the head, nausea and giddiness, sometimes followed by fainting.

I now come to considerations which may interest the temperance agitators.

Prof. Orton, a traveler of some repute, in his book, "The Andes and the Amazon," remarks, that "De Saussure says that a draught of liquor which would inebriate in the lowlands, no longer has that effect on Mt. Blanc. This appears to be true on the Andes also; indeed there is very little drunkenness in Quito. So the higher we perch our inebriate asylums the better for the patients."

The world deems it a great affair to be a martyr to science. Bacon died from stuffing a chicken with snow, and rhetoric warms and glows over it. While not a martyr exactly, I must confess to a temporary inebriety to correct another scientific error.

Before reaching the summit, I thought I should perish of thirst; and but for a piece of gum-elastic, which, by chewing, caused the secretion of a little saliva that moistened my throat, I am not sure that this report could ever have been written. On reaching the

crater, I found the two guides who had preceded me still possessed of a little *Pisco* (a native wine resembling sherry), and of this I took a swallow. After recovering from my exhaustion and completing the barometric observations, I took a second swallow, and just before commencing the descent a third, all within a half hour, yet the entire quantity was not more than the full of two small wineglasses. It acted exactly as it would have done elsewhere. While I was not what the world too well understands as drunk, I was very perceptibly under the influence of liquor. To be sure, it may not have been a fair test, for I had not tasted a drop of any kind of liquor for more than a year and a half; and besides, like Cassio in *Othello*, "I have very poor and unhappy brains for drinking," and often wish with him "that courtesy would invent some other custom of entertainment." One of my guides, however, who had first-rate brains for drinking, was *very drunk*. Arequipa is less than two thousand feet lower than Quito, and yet drunkenness is there the rule. At Vincocaya, already mentioned, at 14,538 feet above the sea, and in fact all along the road at these high altitudes, they seem to have none other God but Bacchus. Nine men in ten, at least, are drunkards. Indeed, I saw so much inebriety there that I was prompted to remark that the people must have taken the poet's irony for earnest, when he said:

"Man being reasonable must get drunk:
The best of life is but intoxication."

At 15,645 feet above the sea, on the summit of the world-famous Oroya railway, running from Lima over the Andes to the head waters of the Amazon, drunkenness prevails almost universally, and to a very dangerous degree. But it is sad to be piling up arguments on the tops of high mountains, simply to demonstrate man's depravity. So, no more of it.

In concluding this lengthy recital, I desire to say what, perhaps, I should have stated at the outset, that my object in ascending the Arequipa volcano was not one of mere curiosity. Besides a wish to examine the crater of one of the most famous volcanoes in the world, I was desirous of verifying a correction in regard to its altitude—geographers having set it down at various figures from 15,000 to 20,320 feet in height. Recently a civil engineer on the Arequipa and Puno railroad, Mr. W. M. Llewellyn, with the very best trigonometrical facilities, made the altitude 18,538 feet, and I resolved to test this by the barometer. Although barometric measurement is always, of necessity, less accurate than trigonometric, in this instance the two measurements were very close, the barometer giving 18,600

feet — a difference of only sixty-two feet. The height of the Misti may, therefore, be set down at 18,538 feet, as calculated by Mr. Llewellyn. It will be a great deal to have this geographical error corrected, for, in the whole domain of science, there is not a single field where so many and such gross errors occur, as in geography — a science, too, that is capable of being reduced to almost mathematical precision. Ascribing the bulk of the credit of this correction to Mr. Llewellyn, I hope that by giving publicity to it, his example may lead others to institute investigations with the view of correcting errors and establishing facts.

The application of science, supported by a desire for truth, will no doubt lower many more ambitious heads, and ultimately give us, in our corrected books, the exact dimensions of all earth's giants.

Since the ascent has been made a subject of considerable comment in South American papers, I have received two statements as to the origin of the name, which I append as matters of record for the use of etymologists. The first alleges that Misti is a Quichua word, meaning Sir, *Senor*, — perhaps from its lordly dignity; and the second, offered by two Bolivian *caballeros*, is that it means *mixed*. They say that when Arequipa was first settled, in 1539, the Spaniards took unto themselves Indian wives, that is, as they always did, amalgamated. As a consequence, the Indians called the town "Misti," or "mixed" town, and the volcano gradually acquired the same appellation. English speaking people declare that its name arose from the fact that its lofty summit is nearly always covered with *mist*, and I am satisfied that the whole subject is decidedly *foggy*.

I. T. C.

LIMA, PERU, 1873.

Lieut. Cochrane then stated that the importance of this ascent in contradicting several heretofore accepted scientific facts, could be best appreciated by referring to some of our standard books on general and geographical knowledge. The Encyclopædia Britannica, Appleton's Cyclopædia, Lippincott's Gazetteer and the Imperial Gazetteer of London, excellent works of their kind, all contain references to this volcano which are more or less erroneous. For instance, all agree that it is an *active volcano*, and two of them assert that ashes and vapor continually issue from it. Dr. Coates, as we have seen, found it cold and without indication of recent eruption. Again, one of these books states that 500 feet of the summit is perpetually covered with snow, and yet the only snow found by Dr. Coates was in crevices. The altitude, as given, ranges from 15,000 to 20,300 feet, whereas the exact height has been found to be 18,538 feet. We

have thus several well-determined practical results from this ascent, and the proprietors of the several books in question would do well to avail themselves of the means offered for correcting the faults indicated. He continued :

Although all accessible authorities seemed satisfied that the volcano had never been ascended, I saw this morning in a New York newspaper, a well-written editorial statement to the effect that ascensions of the Misti were of almost every-day occurrence, and that one was made so long ago as 1667. It further asserted that a German traveler named Haenke ascended it in 1794, and, by careful measurements, ascertained its altitude to be 17,454 feet, and that it had *two* craters, one principal and a secondary one. No further evidence than this is necessary to show that the writer is in error, and is "barking up the wrong tree." His double-cratered and one single-cratered Misti are manifestly entirely different mountains, and this seems to be still further confirmed in another part of the article, where the volcano of Arequipa is alluded to as "the *Guagua Putina*, anciently called the Misti."

A foot-note in the very recent and elaborate work of Paul Marcey, already quoted, shows that this is not the first time that this blunder has been made. It says:—"Modern geographers have mistakenly substituted the *Huayna Putina* for the Misti, a great error, as the former is on the main chain of the Andes in the valley of Moquegua, and about 90 miles south-east of Arequipa." By referring to the chart we find in the locality indicated by Marcey, a mountain marked *Volcan de Omate*, or *Huayna Putina*.

Lieut. Cochrane then gave, with numerous appropriate illustrations, a vivid account of the great earthquake of 1868, and of "The Reign of Terror," in Lima in 1872, and closed with a description of Valparaiso and Santiago de Chile, and of the wonderful railways being built over the Andes by American enterprise. The lecture consumed two hours.

Dr. I. I. HAYES, on rising to move the vote of thanks, said :

LADIES AND GENTLEMEN :— It is customary for the Society to extend its thanks to those who present to it valuable geographical information in the lectures they may deliver or in the papers they may read before it. And to-night we feel an unusual impulse to extend our thanks to Lieut. Cochrane for the able instructions and pleasing lecture he has favored us with, and to which we all have listened with such delight ; but before offering the resolution to that effect, there is another topic upon which I feel that I may say a few words in justice to myself and the Society. It is the departure of our honored and

most highly-respected President, Chief-Justice Daly. It is well known that on Saturday next he sails for Europe, where he will spend a few months. I feel that he should not leave without some expression of our regard for him. He is unfortunately absent to-night, detained by a heavy press of judicial business which must be finished before he leaves, and I speak without his knowledge. Usually a society like this honors the man it elects as its President, but I think you will all agree with me in saying that in the case of our President, the Society is honored by the man and not the man by the Society. Geography with most men is a matter of serious study, but with Judge Daly it is simply a matter of pleasure. He turns from his arduous labors on the Bench to Geography as a pastime and relaxation. Indeed, in the hands of Judge Daly, Geography is a plaything, and he has become a master of the whole subject. In his absence during the summer, the Society experiences a great loss, and we all shall look for his return with great anxiety. And now, as an expression of our regard for him, I move the following resolutions :—

Resolved, That the thanks of the American Geographical Society be extended to Lieut. Henry Clay Cochrane for his able and instructive lecture delivered before the Society this evening, as an expression of our appreciation of his eloquent effort.

Resolved, That the Society, as a mark of its respect and regard for Honorable Charles P. Daly, its worthy and devoted President, on the eve of his departure for Europe, extends its thanks to him for his ability as a presiding officer ; and that a copy of this resolution be spread upon the pages of the Journal of the Society.

The resolutions were seconded by Mr. Francis A. Stout, and adopted amid loud applause.

VIII.

THE NORSE MEETING.

OPENING OF THE SESSION OF 1874-'75.

There was a full attendance of the Fellows at Association Hall on the evening of November 23, 1874.

Chief-Justice DALY, on rising to open the Session of 1874-'75, said:

In opening our meeting it is my melancholy duty to refer to the loss we have sustained during the past summer in the death of our venerable ex-President, Mr. Henry Grinnell. I shall not at present enter upon any lengthened account of his life and services, as it is due to his relation to the Society, the country, and to the geographical world that a memoir should be prepared by a committee, with adequate resolutions, and submitted on a future occasion. Mr. Grinnell was one of the founders of this Society. It was to his efforts, together with those of the late George Folsom, that the first step was taken a quarter of a century ago for the establishment of the Society, and at the meeting at which it was organized, in 1851, he was elected President — a position which, with his characteristic modesty, he declined. But when Mr. Bancroft had been chosen President he consented to serve as first Vice-President, a position which he held for many years. When the late Dr. E. L. Hawks withdrew from the Presidency, Mr. Grinnell consented to accept the position, and served during the years 1862-'3, when he declined a re-election, and I became his successor. He still continued, however, his active relations with the Society, taking the liveliest interest in all its proceedings, and was present last winter at the public reception given by the Society to the crew of the *Polaris*, when he brought with him an unfolded flag which he had originally sent on the Wilkes' expedition to the Antarctic, and which he afterward sent four times to the Arctic in the respective expeditions of DeHaven, Kane, Hayes and Hall. It is to him we

owe the first American expedition to the Arctic. He furnished and provisioned the two vessels for the expedition of DeHaven in search of Sir John Franklin, which started in May, 1850. In conjunction with the late George Peabody he manned and provisioned the brig *Advance*, commanded by Dr. Kane in the second expedition of 1853. He was a large contributor to the expedition commanded in 1861 by Dr. Hayes, and he alone furnished the means to send Captain Hall on his first journey to Frobisher's straits in 1860 in search of Sir John Franklin. It was also chiefly through his instrumentality that Hall was able to make his second journey in 1863, in which he passed five years on the scene of his previous explorations. It was to the means, in fact, which he supplied that Hall obtained the experience and training which led Congress to confide to him the command of the *Polaris* in the last expedition. In that beautiful poem of Campbell's written on a blank leaf of La Perouse's voyages, there is an expressive couplet suggested by the strait through which the French navigator passed on the coast of Japan, and which bears his name. It is in these words:

Fair Science on the ocean's azure robe
Still write his name in picturing the globe.

And so it has been and will be with Henry Grinnell. In that long line of coast known as Grinnell Land, which, beginning in Smith's sound, extends along the west side of Kennedy's channel, his name is imperishably written, and will remain forever a monument to his enterprising spirit, the benevolent feeling, the broad and generous aspiration of an American merchant. The present evening is devoted to hearing two of our Fellows who have just returned from expeditions to the north of Europe; Dr. Hayes, who went to represent our Society at the one thousandth celebration of the founding of Society in Iceland, and M. Du Chaillu, who has followed up his travels in Norway and Sweden by further explorations in Lapland. It is very gratifying thus to have the reports brought by our own workers.

ICELAND'S MILLENNIAL — DR. HAYES' REPORT.

After a brief preliminary address, Dr. Hayes said:—

We arrived at Reykjavik, the capital of Iceland, in due season to take part in the first ceremonies, August 2. Meanwhile the King of Denmark, Christian IX, had arrived, Germany, Norway, Sweden, and France being represented by ships of war. The occasion was one of unanticipated dignity and ceremony. The people were, however, impressed with the importance of the occasion, that the display

was not in excess of their expectations, and they bore their part in it with the traditional and high breeding of their Norse ancestry. Our credentials being delivered to the proper authorities, we were courteously received, and situations were assigned us in accordance with rules previously laid down for the reception of the representatives of learned societies. These were always near His Majesty the King, the Governor of the island, and the Mayor of Reykjavik. The formal occasion embraced divine service, the cathedral rival proceedings at Thingvall, and two public banquets. The cathedral services were very impressive. A native hymn, called "Iceland's Thousand Years," was sung by the entire congregation with marvelous effect. The music was fine, the voices excellent, and the occasion being one of deep feeling to every Iceland, it is not surprising that there was exhibited a deep emotion. Never before have a people celebrated the thousandth anniversary of an organized government, substantially following the organic plan, and certainly it would be impossible, at the present time, for any other people to celebrate, in this sense, its millennial and claim consistently to preserve its language, laws, and social customs practically unimpaired by the lapse of time. After the church services the King, at his banquet, arose and drank prosperity to the future Iceland; a hundred cannon echoed the sentiment, and amid the wildest enthusiasm the new constitution was proclaimed. This gives Iceland practical freedom from Denmark, and no doubt it will tend greatly to develop the country, which possesses many resources needing cultivation to make them profitable. At present the chief exports are codfish, salmon, and wool. While the cultivation of these industries does not create any large degree of individual wealth, they are productive of general competency. I found the necessities of life possessed everywhere in abundance; luxuries were not uncommon, and the people were happy and content. The school system is most admirable, and the Icelanders show a remarkable greed for learning. In the humblest peasant hut you always find books. Some of our English classics are translated and published in Reykjavik, and are greatly in demand. The bookstore was crowded when I visited it. Crime is almost unknown, the common jail not having had an occupant, except the jailer and his family, these twenty years past; not indeed until this last summer, when the King's staff used it as head-quarters. Reykjavik contains about seventeen thousand inhabitants, and is mainly composed of comfortable frame houses, roofed with slate, and surrounded by little gardens, in which are cultivated potatoes, cabbage, and other common garden vegetables. None of the cereals, not even barley and oats, will ripen, though it

is said they were grown there in former times. The fruits mentioned in the ancient Sagas have wholly disappeared, if we except the low stunted birch and willow bushes, which, however, are not found near the coast. The timber needed, even for the small farm-houses of the interior, is brought from Norway. Yet the bush supplies a sufficiency of fuel in those places, while near the coast, as at Reykjavik, peat alone, of which there are exhaustless beds, is the only fuel, except occasional supplies of English coal. The present aspect of the island is that of a forestless girdle of green, inclosing a volcanic desert, and inhabited by about seventy thousand people. This girdle is in places but a few miles wide, but in others it extends for a considerable distance up the valleys, such as those, for instance, through which flow the Heita (white) and Thorso rivers. In the valley of the former are found the Geysers, long famed as the most remarkable spouting springs known in the world, until Prof. Hayden's recent discoveries in the Yellowstone region. These I had the good fortune to visit and examine with minute care. The full details of my measurements and investigations there I feel could not be crowded into the short space of time allotted to me this evening, and I reserve them, therefore, for another occasion. The Stroker Geyser spouted quite two hundred feet for our benefit.

The famous Lagborg, where the Allthings met, presents even a more grand and fearful appearance than the old sagas describe. Our reception here will long be remembered, taking place as it did by the side of the rising waterfall of the famed Oxara river, and beneath the giant-frowning lava cliffs of the Almana-gia. My companions during this somewhat singular reception were, besides Mr. Field, Mr. Bayard Taylor, Mr. Murat Halstead, Professor Kneeland, Mr. Gladstone, and Professor Ericker Magnusson, a native Iclander. From all these I met with the heartiest co-operation. At one time it was hoped our friend, Mr. Paul du Chaillu, would join us; but that eminent traveler seems on the whole to prefer to travel alone, and perhaps he is wise; and, judging by his mind, you would certainly say so, for, whether sweltering in the malarial jungles of Africa, or drinking in the glories of the land of the mid-night sun, he is ever an active observer of men and things, and I am rejoiced to be associated here to-night in the general illustration of Norseland with one who has done so much to promote our knowledge of strange places, and to deserve in its best sense the title of traveler.

LAPLAND—M. DU CHAILLU'S REPORT.

In the north of Europe there is a large tract of country very thinly inhabited by Swedes, Norwegians, Finlanders, and Laps. Its coast is indented by numerous fiords of great beauty, the sea being of great depth, and winding its way inland, often in the midst of stupendous scenery. These fiords were dug out of the solid rock by glaciers on their way toward the sea. The geological features of that country impress the mind with the great and constant changes that have taken place, or are taking place. The rocks are granite, gneiss, and mica schist. As one studies the coast line, the eyes rest continually on series of terraces one over the other, perfect in shape, almost all situated at the entrances of valleys. These terraces show distinctly by their rounded pebbles the rising of the land above the water, this slow and almost imperceptible rising still taking place in our time. This country was once under the influence of a much milder climate, as genial as that of England now. We must conclude from inferences that the icy period is making again its appearance, and that that impenetrable belt of ice which seems to bar the way to the North Pole, and which our distinguished member, Dr. Hayes, has partly explored, was once an open sea. In the interior of the country, inhabited by Laps, one meets everywhere positive proofs of the rising of the land. Shells are found several hundred feet above the present level of the lakes; mountains have been polished as smooth as glass by the action of the ice; bowlders of all sizes have been scattered over the land by the glaciers. Advancing glaciers are demolishing to this day and breaking the granite hills which oppose their march, while the retiring ones leave behind them bowlders, sand, gravel, etc.

There are sea Laps, forest and river Laps, and nomadic Laps. To-night I am only to speak of the nomadic Laps. The whole population of Lapland amounts to about thirty thousand, the nomadic Laplanders numbering about twenty-five thousand, and possessing about five hundred thousand reindeer. Their herds vary from fifty to five thousand. There have been Laplanders possessing even ten thousand reindeer. A man possessing from five hundred to a thousand reindeer is considered rich; those who possess only fifty to one hundred are poor. The reindeer is every thing to the Laplander. With its skin he makes his clothing, shoes, gloves; with its sinews his thread. He feeds on its flesh, and the animal is his beast of burden. The value of a reindeer varies according to the country. Driving reindeer broken to the harness are not very plentiful, and cost from \$10 to \$15 each; a common one from \$4 to \$6. The most

intelligent Laps are the Swedish and Norwegian, compulsory education having reached that distant region. They all know how to read. Every one is or must be confirmed, this ceremony being part of the Lutheran creed; hence all must be able to read the Bible, and know their catechism. Churches are scattered here and there in the desolate regions, and the church-going Laps come into them on Sundays from every side.

IX.

WESTERN EXPLORATION.

By LIEUT. GEO. M. WHEELER, U. S. ENGINEER CORPS.

A large gathering of the Fellows was present at Association Hall on the evening of December 23d, to listen to an address on Western Exploration, by Lieutenant George M. Wheeler, U. S. Engineer Corps, who, upon being introduced by Chief-Justice DALY, said:

MR. PRESIDENT, FELLOWS OF THE GEOGRAPHICAL SOCIETY, LADIES AND GENTLEMEN:—It affords me great pleasure to appear before you, in response to a call from your committee, for the purpose of narrating features connected with the expedition that has been intrusted to my charge, during the few past years, and I hope to be able to speak succinctly of a few of the great number of important questions entering into the subject of geographical inquiry, now being carried on in the immense territory of the United States west of the Mississippi river.

I have no need to tell a critical assemblage like this, that for the first time I am placed upon the stage to attempt to instructively entertain an appreciative audience. I cannot expect, and hope that you do not, that I shall meet the requirements of the trained and eloquent speaker; but if you will bear patiently with me, I shall attempt to portray, in addition to some scenes and incidents, and professional results of one of our field seasons, a brief resumé of what has been done in this comprehensive field heretofore, and in addition thereto, treat of a few of the prominent and pertinent points of the relations that interior surveys bear toward the government.

CONDENSED HISTORICAL RESUMÉ OF EARLY EXPLORATION.

As is well known by most of those present, shortly after the commencement of the present century, and but a little subsequent to the

establishment of our independence, the United States having acquired what was known as the "Louisiana purchase," President Jefferson, then chief magistrate, was the first to conceive of the necessity of sending to this portion of the continent organized parties to examine into the purchase, and to find out what the government had secured. At this time the expedition headed by Lewis and Clarke was organized, the former a nephew of, and military secretary to, the President; the latter an officer in the army. The inception of this work has not merely signalized the wonderful intuitive power that has been accredited to Jefferson, but shows at this early day the value attached to systematic governmental support.

With all the facilities at this time available, this, one of the most prominent expeditions of the first quarter of the nineteenth century, started out to pierce the north-western interior. This was the first well-authenticated and well-equipped expedition that had for its mission an inquiry into the extent and resources, then comparatively unknown, of this great and almost continental area. It is true that at an earlier period, in our south-western territory, the trips of the early Jesuit missionaries, following the expedition for the conquest under Cortes, and later parties, sent out under the sanction of the government of New Spain, both inland and coast-wise, had their origin and results much in advance of the historial epochs of the colonial, State and territorial independencies of the government of the United States. But their results were comparatively of little avail in bringing to light facts and deductions susceptible of being drawn from these great areas.

Dwelling with so much significance upon this individual effort in the threading of interior spaces has not been done with a view to pass encomium upon one more than any other expedition, upon one more than any other individual, but to draw your attention to an epoch in history which it has been my pleasure to see so distinctively noted within the last few years. Later, Lieut. Pike, afterward Gen. Pike, killed in the war of 1812-14, headed an expedition extending over a period of three years, first in and about the head waters of the Mississippi, and afterward to our south-western boundary, then limited by the Arkansas, and, from a misapprehension of geographical boundaries, having passed beyond the limit of what was then the possessions of this country, found himself and party upon the western borders of the Rio Grande. Stockading himself against the Indians, he found but too soon that another people were more his enemies, and here he was taken prisoner by the Mexican authorities in 1807.

It has been our good fortune during the past season to ascertain

the fact that at the junction of the San Antonio and Conejos creeks, in the south-western part of Colorado, remains the remnants of a stockade, marking the spot where this occurred. Other evidence was accumulated, showing that his parties crossed the Sangre de Cristo pass. All the results of that important expedition never reached the archives of the government, and to-day they lie in the records of old Mexico, or with the priests of the inland territory.

After the war of 1812-14, the country having reached a stage of comparative quiet, explorations again resumed a magnitude not known before. In the years 1819-20, after the organization of the Corps of Topographical Engineers, whose labors in this field are well known, Major Long started in 1819 from the Alleghanies. The results of this expedition, in view of the improved instruments and methods, and the facilities that could be placed at his command, were much in advance of what had been accomplished before, and the maps of routes then made were of great importance to the government, and frequently consulted.

But little was done after this expedition until the time of Bonneville, in 1832-36, who, following out the endeavor to explore lines leading into the then inaccessible portions of the interior, was absent so long from his command as to be dropped from the rolls of the army. However, his journal, notes, plates, etc., when received and compiled, added largely to the stock of geographical knowledge relating to this portion of the public domain.

Again, an interval, and we find in 1842 that the then Lieut. Fremont, of the Corps of Topographical Engineers, having been assigned by President Tyler to command one of the most important expeditions into the interior of the country west of the Missouri river, started from St. Louis,—another instance where a President of the United States was impressed with the grave importance of a correct knowledge of our immense western possessions, that embrace some of the most important areas of drainage in the world. The parties of this expedition were engaged in field and office operations until the close of the season of 1845.

The importance attached to the results obtained, and their effect when utilized, upon the line of march of emigration toward the West, has become a matter of history more fixed in the minds of those who have traversed the regions beyond the Alleghanies.

In speaking of the West, it is well to draw attention to the fact that the Mississippi and Missouri rivers marked the geographical limit of the great West at this period, a line of easy transit, strangely enough, acting as a barrier to civilization; still beyond it little

authentic was known. How well has been proven since that time that one of the powers that rule the world (hard money) has attracted multitudes to the shores and slopes of the Pacific! After the discovery of gold in California, there was established a steamship line between New York and San Francisco; subsequently a telegraph line, and later still the Pacific railroad became an acknowledged fact — each forced to completion from the necessities of the government and the demands of inter-commerce. However, since the early days of exploration and survey, the boundaries of our western domain have passed through successive changes.

For a correct understanding of these changes I would refer you to one of the maps of the Statistical Atlas of the United States, recently compiled under the direction of Prof. F. A. Walker, of the Census Bureau, that relates to the acquisition of territory in the United States, and its subsequent distribution into political divisions.

This expedition (Fremont's) was followed by others, all of more or less importance, and especially so since by them was proven the necessity for the organization of parties to obtain information for the government in this vast inland interior. To carry out such a policy, from the year 1846-47 until 1852, expeditions for the Pacific railroad surveys and others were sent out, mostly under the auspices of the War Department. Many of the names of the heads of these expeditions are familiar to you all.

The former were sent out at the instance of the Secretary of War, to investigate routes of travel to the Pacific, a subject exciting public attention at that time. With matured plans, methods of observation and investigation, with a *personnel* selected by the departments and bureaus, several well-organized expeditions took the field, and every one knows more or less of the results of the Pacific railroad surveys. Stores of useful knowledge accumulate so rapidly in this country, and still there remains so much to be learned, that it almost seems amiss to ask one to look backward; indeed, it may appear that I, of all others, now directing a work that has its future nearly all before it, can hardly be pardoned for asking a few moments of retrospection. Perhaps it may be unfortunate that we should stop for a moment to look backward, but in the operation of geographical inquiry and endeavor, like all others, we should look upon both sides of the question; and one of the lessons that may be drawn is, that it has been principally "measures, and not men," that have governed the intervals during which expeditions have been dispatched into the unsettled and inaccessible portions of the far West. It seems proper to add that the results of the Pacific railroad surveys led to the construction

and compilation of what were then the most accurate maps. Warren's memoir, which forms a part of the Pacific railroad reports, fully sets forth an historical resumé of this matter, and has been frequently consulted, and is the authority up to the spring of 1857. Although the topographical material had not been gathered for the precise purpose of making maps, yet I know that every one present will admit its pertinence when I say that the government and the public may well feel thankful to the wisdom of the minds that conceived the propriety of placing all this material in the form of a map, whose uses have since entered into the education of the country. Subsequent to the close of the Pacific railroad surveys, and the resulting maps and reports thereon, officers of the then Corps of Topographical Engineers prosecuted further surveys in this region, called for by the necessities for information experienced by the War Department, bearing upon communication and supply between interior remote points. Their number was comparatively few, owing to the commencement of what has since grown into a system of river and harbor improvements, whereon officers of this corps were preferably placed. While many important expeditions were in progress, boundary surveys between the United States and Great Britain on the one side, and Mexico on the other, were carried on. The names of Graham, Emory and Parke are familiar in this connection.

Notable among the later expeditions are the expedition of Warren to the Black Hills in the North-west in 1855-'57; Macomb in 1859, outward from Santa Fé to the junction of the Grand and Green rivers, and return; Simpson, with the army under Johnson, in Utah, to the eastern base of the Sierras, at Carson city, thereby shortening the principal wagon route to the Pacific, and perhaps others which, in the hasty mention, may have escaped attention. Their names and facts have been placed upon the record, and have already passed into history.

I may be excused for calling attention to a portion of the President's message sent forward to Congress during the past session relative to surveys, wherein the Chief of Engineers states in referring to the resumption of labors upon interior topographical surveys by Major Long, the following appears: "And succeeding him, these were continued by officers of the army, whose names would furnish a long list of men distinguished in their profession." I recollect most vividly a statement made not long since by a prominent Senator from the West, while speaking of no less a personage than the late Senator Fessenden from Maine, that this distinguished statesman, although conversant with legislation in its broadest sense, thoroughly informed

as to governmental necessities, well versed in the manners, customs and wants of the people, still never seemed to comprehend that the United States had expanded beyond the Alleghanies, while at and beyond the extremities of arteries leading to the heart of this portion of the continent more than elsewhere the government should extend its powerful protection.

Subsequent to the war there have, also, been organized and carried out under the Engineer Department of the army, the Geological Survey of the 40th Parallel, in charge of Clarence King, from the Department of the Interior, the United States Geological Survey of the Territories under Prof. Hayden; the survey of the Valley of the Colorado under the Smithsonian Institution, in charge of Mr. Powell, the latter was transferred at the past session of Congress to the Interior Department, also the expedition for the demarkation of the northern boundary under the State Department, with Archibald Campbell as Commissioner and Major Twining, Corps of Engineers, as chief astronomer; and at the head-quarters of the several Geographical military divisions and departments officers of the Corps of Engineers have been engaged in reconnaissances and surveys of various kinds, but of their several characters and objects, I feel that it is not my mission to speak. Their works are passing into history, and your distinguished President, Chief-Justice DALY, in his annual address, chronicles their current operations.

DESCRIPTION OF EXPEDITION OF 1874.

The system of opening a means of communication between points widely separated in the interior had become well advanced at the beginning of the rebellion, and it was found both judicious and economical to make expenditures of the public money for interior surveys, and certain improvements and constructions growing out of the same for the uses of the War Department, and in furtherance of industrial interests. And as has before been stated, officers of the corps of Topographical Engineers were called upon to take a prominent part in this task. This corps during the interval of the war were merged with the corps of Engineers proper, and their duties assimilated thereunto. What might have grown from this want on the part of the government had not the war of the rebellion been prosecuted, let none of us imagine. Inasmuch as it has been a part of my task to look a little into what has been done as well as to project current and future operations, I may be pardoned for thinking to maintain that what has been partially begun, and in a small degree carried out

by myself and others of late years, might easily have become a thing of the past, but for the intervention of the war.

However, finding myself in the year 1869, a member of the staff of Brevet Major-General E. O. C. Ord, then commanding the Department of California, and under his direction being sent to investigate certain practical subjects relating to interior communication, for the first time in my experience as a public officer, it became my duty as it was my pleasure to examine topographically portions of the areas shown upon the progress map thrown upon the screen. After returning from that trip, which was carried on at a small expense, and which attained nothing beyond the dignity of a reconnaissance, there grew into tangible form evidence favorable to a continuance of Explorations and Surveys which it was then deemed proper to lay before the War Department. The trip of that year had its close, and its results were immediately made available, but it was not until the spring of 1871 that the War Department, by authority of appropriations made at that session of Congress, saw fit to send out in force an expedition complete enough to take cognizance of the binding together, as it were, of the old routes of survey and compacting them into a whole, giving an order and form based upon the physical details of *areas* as contradistinguished to *lines* that singularly enough had never been attempted before.

Returning from the field at the close of the expedition of 1871, the project of interior survey that I have hastily brought to your notice while explaining the "Progress Chart," was laid before General Humphreys, Chief of Engineers, and General Belknap, Secretary of War, and approved by both. Their hearty support has been since maintained, for a lack of which and the intelligent aid of a few far-seeing friends in Congress, the expedition of 1874 would not have been sent out for the further prosecution of these labors. The expeditions of 1871, as well as those of 1872-'73, took the field and returned, harmonizing their field and office results as far as could be, so that the mass of useful information might become immediately available to the War Department, thence to the other departments of the government, and indirectly to the public. And it is with no little pride that I quote the following paragraph from the annual report of the Chief of Engineers, submitted to the Secretary of War, and forwarded to Congress at its present session:

"By experience and improvements in methods and instruments, the value of the results is annually enhanced and the cost of the work amply repaid."

But these matters interest but very few of you, and therefore I

shall at once come to a description of our trip during the past season, which has been directed to portions of the political divisions of Utah, Nebraska, Colorado, New Mexico, and Arizona. The number of parties in the field have been 9, the number of officers and assistants 86, fewer than the usual number, since our routes lay in regions not infested by hostile Indians, and hence no escorts were required. These have been distributed into the several geographical fields of inquiry, including the cognate branches of scientific research, geology, paleontology, mineralogy, natural history, etc. The force consisted of officers of the different arms of the service, aided too by professional gentlemen drawn from civil life, since this, like all classes of interior works carried on by the War Department, have been partly military, partly civil, working always in harmony, as it has not been deemed essential to confine labors in so comprehensive a field to one class of persons.

The point of departure was Pueblo, Colorado, at the end of the little narrow gauge railroad that follows the eastern base of the Rocky mountains, south from Denver, and to which point persons, animals and supplies could be easily forwarded. The detailed operations of the Survey, however, were to be to the southward of the Spanish peaks, marked points noted by all early explorers, travelers and settlers throughout the region, and lying for the greater part in New Mexico, while the basins of drainage entered and occupied were the Arkansas, Cimarron, Mora, Pecos, Rio Grande (its eastern, upper and western branches), and the San Juan rivers, all possessing a topographical grandeur each its own, yet each different in its local physical peculiarities, each as large as one of our minimum states, with all due respect to Rhode Island and Delaware; the entire area being fully 35,000 square miles, so large that we might almost (to speak figuratively) pick up the whole State of New York, drop it into the same, with a prospect of total immersion. The points of prime geographical necessity were those from which a series of base lines were measured from points, astronomically determined with the utmost accuracy, and located in vicinity of Hughes, Colorado Springs, Labran and Trinidad, Colorado; Cimarron, Fort Union, Las Vegas, and Santa Fé, New Mexico, at which points bases, measured and developed to check the main triangulation extending throughout the mountain ranges, were laid out. Three parties were engaged in the establishment of interior astronomical points and the prosecution of the main triangulation, and others in filling in from main topographical stations by other trigonometrical means and collecting the topographical details necessary for the obtainance of all the horizontal

and vertical lines requisite for the map. It may be well here to explain that in this survey for mapping considerations alone, the engineer is compelled to apply three of the most prominent of the scientific branches in order to obtain satisfactory results; *i. e.*, Astronomy, Geodesy and Topography, which go hand in hand, immediately allied with the hypsometrical determination of altitudes. This has been done with a degree of success not marked in the earlier stages of the work, but most gratifying to all who maintain an interest in it. Persons specially skilled in the forms of the present and extinct fauna and flora of this region have been afforded facilities to prosecute their studies in connection with the movement of the field parties with marked success. As, however, this work, founded upon the necessities of a department of the government alone, can entertain but one standard, practically that of paying its way as it goes, the latter may not have been brought to so full a standard of excellence, as in parties which the government has at times sent out to prosecute especially this class of examinations, yet in the humble way in which these matters have been brought to fruitful results, it is believed that for the limited time and means much has been added to the store of knowledge in these important branches of science, and to the individuals who have been responsible for, and who have accomplished this work, most of the thanks are due.

I will ask you to follow me while I describe rapidly the march of that part of one of the nine parties conducted by myself out from Pueblo to Pagosa Springs, in the valley of San Juan, and thence returning to the valley of the Arkansas. As no statement of mine will accommodate your minds to the peculiar atmosphere and structure of mountain and other forms that meet the traveler in these regions, I will confine myself to the simple line upon the map, and ask you to trace with me the locus and windings of this route.

The road from Pueblo to Fort Garland, on the eastern side of the Greenhorn range, that faces outward toward the Arkansas valley, skirts the foot-hills of this magnificent series of ridges, that has lately attained a more practical grandeur on account of important mining interests that are being developed, notably in the Rosita silver district. New discoveries are also being made, and when one can look at a mountain range and imagine that *silver* may come from that enormous structure, silver already found, or silver yet to be found, there grows an idea of enchantment that makes the traveler, the practical man, or the mining operator stoop with awe upon beholding so colossal a treasure house in which is seen the basis of future economic wealth now lying hidden, and awaiting only the call of ener-

getic labor to withdraw it for the uses of mankind. We started from Pueblo and traversed the base of this range during the month of August in the most delightful part of the season, and crossed the Sangre de Cristo pass (a fearful name, but the pass fully justifies it), until we entered the valley of the Rio Grande and the famous San Luis park, so called, an immense detrital plain simply, park it is not, valley it might be called from its physical shape.

Reaching the little post of Fort Garland lying upon a strip of land between Sangre de Cristo and Ute creeks, we came to the border line, of government civilization at least, for here we find the same located in a few adobe houses in which government property is stored half in corral and half in dingy flat top huts, with apertures resembling loop-holes, although fashioned by nature. Here were stationed a fraction of the army so well sustained upon our frontier for the protection of civilization advancing in face of many obstacles.

Here we rested for a few days in camp on a little island beautifully ensconced among the trees. An island because it was like an oasis, situated on a dusty plateau, surrounded by a little stream of about two feet of water, all from the Ute creek, or what is left of that stream after emerging from the foot hills. From this point directly across the wide valley of the Rio Grande, we reached a number of Mexican settlements on the western side of the most southerly county of Colorado; thence farther westward to the little settlement of Conejos. Without guides and without escorts, we passed from this point up the stream of the same name, changing soon our route to the northward, and climbing a noticeable peak that from the valley below stood out boldly in the horizon, the view from which can only be compared to that of entering a paradise.

One of the earliest points visited by us was named Prospect peak, from which, looking eastward and north, is seen the great San Luis plain, and to the west the little valleys of the Conejos and its minor tributaries clothed with grass, presenting most beautiful oscillations of color to the eye, while farther in the horizon lay long mesa lines heavily clothed with pines and deciduous foliage, all lending a calm repose to the landscape seldom witnessed.

Within these tributaries we spent a portion of the season; finally, after treading in and out, reached the sources of the eastern streams, and one stands upon the backbone of the continent, at a mountain summit rising majestically from the half plateau, half mesa forms, standing a proud and conspicuous monument (duplicated nowhere, so far as I know), marking the powerful line of serrated ridges, which

from the 49th to the 32d parallel, divide the waters of the Pacific from those of the Atlantic.

Here we encountered storms, with thunder and lightning, which, after their exhibition of temper, left a clear and radiant sky, lighting with magnificence the well-developed flora of this region. Continuing westward, we followed with considerable difficulty a stream, which afterward proved to be what will be named the eastern branch of the San Juan, to its junction with the main or upper fork, thence to the famous hot springs at Pagosa. These were examined by parties under Col. Macomb, in 1858, who visited them while exploring for a wagon road, and have been described by Professor Newberry, geologist to that expedition, in a report that it is believed has never been published. This was a point for rest and rendezvous, and the most westerly reached by myself. In a trip to Sierra Amarilla, in the valley of the Chama, the backbone of the country was again crossed, but, how different the grandeur of this latter crossing. Here the erosion of the horizontal strata leaves a poorly marked line from which waters flow either to the Atlantic or Pacific. Indeed, it is most difficult to determine the precise points of this line from which precipitate moisture would flow to hither or yon side.

Returning from Pagosa, with a specially organized party, the main head of the San Juan was reached, thence through flood, mud, snow and forest we reached the westerly arm of the Rio Grande, which nestles its perennial head within the southern line of the Uncompaghre mountains, grazing most marvelously the heads of the San Juan, about which occur a series of complicated folds for a distance of 80 miles. Thence flowing to the south, it comes to an area covered with quarternary deposits in this portion of the Rio Grande basin. One little experience gathered while making this trip, although not altogether agreeable, may perhaps amuse, if not interest you all: While camping near the summit of one of the many ridges skirting the tributaries of the upper San Juan, at an altitude of 10,250 feet, a heavy rain began just at dusk, and minus an epicurean's supper, with a wet bed, without forage for the mules, with numb fingers, and dread of the night, we were made the recipients suddenly of a succession of grand physical phenomena, which it has not been my fortune to witness before. Just at the small hours of the morning, while looking up through the mantling cover of fir and aspen, could be seen glimpses of wavy clouds and the moon clearly shining, while the peculiar shuddering effect that comes from cold water dripping down one's back was experienced by your observer, although carefully ensconced in his blankets, and while simultaneously in another quad-

rant of the heavens a snow storm of considerable vigor was actively going on.

Indeed we had snow about four inches deep, or rather in the morning we had this. During this interval the grumbling followed by vivid and clear flashes of lightning afforded yet another species of pyrotechnics on the part of the heavens, all creating an awe of the power of nature more impressive than all powers of description. One by one was heard the crack of trees, broken and demolished by the violence of the wind, driven at a fearful rate. You can well imagine how much this was enjoyed, how much we all slept; but, fortunately for the alacrity which we desired in our homeward march, we found ourselves early on the road next morning. It is a matter worthy of scientific note, this peculiar relation between clouds, moon-shine, clear sky and thunder, hail, snow, etc., which I believe has hardly ever been observed before. Marching steadily on in this portion of our season's trip, we reach a point near the south fork of the Rio Grande, thence to its junction with the main stream, and to the little mining town of Del Norte, on the western side again of this great San Luis valley. Here another division of one of the small fractional part of the expedition took place—a portion withdrawing by stage communication leading to the Arkansas valley. In the latter direction your observer traveled hence to Pueblo. The season's trip was short, but one full of varied incidents, and of extended observation in the mountain portion of one out of the twelve extended trips taken by myself in the mountains of the west since the summer of 1868. While a fragment of the main party were returning under my direction, the remainder, under Lieut. Whipple of the army, prosecuted their inquiries westward toward the mouth of the San Juan, another, under Lieut. Marshall, were in the upper and northerly parts of the San Juan basin, among the mines lately discovered there, and succeeded in completing the triangulation begun in 1873, stretching well-conditioned belts of triangles southward, thus connecting with the series established in New Mexico in 1873. This party have accomplished their season's work, as have also the others, and returned to the office in Washington for the elaboration of results.

Lieut. Birnie directed a party immediately south of the main division, debouching from the mountains eastward at Cimarron, New Mexico, at the close of the season, having reached the western boundary of New Mexico, covering the area south to Abiqui in the valley of the Chama, and westward to include the main southern tributaries of the San Juan.

Lieut. Price, with a special triangulation party, to which were added a mineralogist and collector, occupied portions still farther to the south, their southward latitudinal line being that through Las Vegas, New Mexico, and their eastern limit the ridge of the main range bordering upon the plains, and dividing the valley of the Pecos from the Rio Grande.

Lieut. Blunt and party were assigned to a portion east of the main ridge, and bounded, latitudinally, north and south, by Las Vegas and Trinidad, Col., east by $104^{\circ} 7' 30''$ of longitude.

A special party for making collections in natural history and certain hypsometrical determinations followed a line leading from Santa Fé, via Fort Wingate, Camp Apache, New Camp Grant, Fort Bowie in Arizona, and returning via the same post, except Wingate, and including Forts Tulerosa and Craig, to Santa Fé. Their labors were crowned with most gratifying results, at a minimum expense, and fill in gaps in the natural history areas, left vacant in other years, extending observations upon geographical distribution, with new forms.

Yet another party for special natural history and paleontological study, under Dr. Yarrow for the early part, and Prof. E. D. Cope for the latter part of the season, pursued their investigations in the valley of the Rio Grande, north of Santa Fé, and in portions of the southern San Juan basin, with most gratifying results. Prof. Cope has already submitted descriptions of new vertebrate forms that have been published.

A substantial stone and brick observatory was established at Ogden in 1873, and was occupied as a connecting station; to it were sent signals from the main stations occupied by another party in New Mexico, Colorado and Nebraska. In this connection I beg leave to state, that the Western Union and Atlantic and Pacific Telegraph companies have, as usual, extended most liberal aid to the longitudinal campaigns, without which efficient assistance, the same degree of success could not have been obtained. It may not be amiss to note, that in addition to the collection of topographical data, knowledge regarding the resources of the area traversed and surveyed, is one of the objects of investigation. As another and higher branch of the work, may be mentioned the establishment astronomically of geographical points at selected positions within the entire area, west of the 100th meridian. Many of these have been made available to the wants of the survey in carrying out its mapping objects. At others, conspicuous and solid monuments of stone, with the meridian line passing through them, have been erected, establishing a line

accurately marked available for the uses of governmental, corporate and private surveys, of practical advantage for all time to come, and the better understood the more known. Indeed, I have been informed, by the Surveyor-Generals of Nevada and of Wyoming Territories, that they had been made use of in the determination of the annual change in variation of the magnetic needle, a matter of great importance in fixing the location of the property of all settlers, thus acting as a safeguard against questions that may be raised in the future, as to the boundaries of landed properties, for in the newer portions of the great west, unlike New England, there are few artificial boundaries marking the extent of estates agricultural or mineral, and the variation of the needle entering as an element into all land titles, is subject to an unknown annual fluctuation. While to-day in portions of our western interior, land may not be worth the government minimum price, it may in the future be worth maximum sums. It is well then that these meridian lines are established at this early day, and future generations will be thankful for what has already been done, were the good work to be at once suspended.

While I can add but little of interest gathered by myself and individual members of the parties throughout the season, I will tell you that with but one casualty to be noticed, all have terminated their duties and reached the point of disbanding at Pueblo, and are now on their way, or have reached the office of the survey at Washington. To attempt at this time to lay before you any detailed features of the several branches of the work, as to their scientific or other values, would be exceedingly premature; I will leave that for another time. I hope that you will only expect of me statements made in the most general terms, for I have not deemed it advisable to come before you on this occasion with a finished scientific paper, nor with the dry material, such as often forms a part of many of the messages and documents to Congress, but hope that I will have proven to you that we are adding our mite in the line of geographical inquiry, and I beg to state that the time I can take from my strictly professional duties is extremely small. The region of country entered by the parties this year presents physical peculiarities of marked characteristics, consisting of massive mountain forms, plateaux and rivers; and although it cannot be said of a large portion of the area that the agriculturist has great attractions extended to him, yet with the advancement of legitimate mining enterprises there will grow up a demand for farming products that will not be dependent on cheap transportation, and will enrich, not as do the prairies, where sometimes corn has to be burned in the field, but with proceeds from a

ready and elastic market for all the productions of the soil. There are vast fields, suitable for grazing purposes, ready with their perennial and perpetual supply of nutritive grasses, sufficient for numerous herds of cattle and sheep, lying ready to provide beef for the nation — beef for the nation when the United States numbers her one hundred millions, as well as we have to-day beef for the nation with its forty millions.

This great supply, the capacity of which has been largely called into question during the past few years, attracts a growing attention, and to the question, Where is to come beef for the millions of Americans yet unborn? I would answer, after a personal observation of portions of 250,000 square miles of the western interior, "Go west" to the inland valleys, detrital plains and extensive plateaux, and there you will find provided, through the handiwork of Nature, material for the preparation of beef for these future millions, inexhaustible for several generations at least.

I wish to call your attention to the condition of some of the prospectors in South-west Colorado, as noticed during the past season. In the different trips in the western mountain region, especially east of the Sierras, from Nevada to Arizona, that have been conducted by our parties, we have met a large number of these hardy pioneers hunting for "gold and silver." Those who have wended their way into the remote sections of Colorado, unlike most of the prospectors, however, of the Nevada and Arizona regions, who disdain to labor, except when they are out of "grub," and then are able to replenish the necessities of stomach and pocket in some flourishing mining district, we found many departing from the San Juan mining country, who had been flush in the early part of the chase, but now, instead of one man to four donkeys (a magnificent outfit), four or five men were often seen behind one donkey, the latter carrying all the worldly goods that these men possessed. Cases were presented where charity had occupation, and it was with extreme pleasure that on one we divided four-fifths of what little food we had among a party of men, in order that they might no longer go hungry. It is to be remarked, however, that the total four-fifths of our store was not enough for one meal; still we thought to have added to our record in the cause of suffering humanity.

I would like to call the attention of the Society to the distribution of forest areas, as discovered and entered by parties of the survey. It will be recollected that upon the maps made at the close of the Ives expedition of 1857-'58, there was placed the name of Black or San Francisco forest. Its extent in either direction was not laid

down. However, our surveys go to show that this great forest is probably the largest south of the 40th parallel. It extends from about the 107th to the 114th meridian west from Greenwich, of irregular width, varying from 30 to, say, 100 miles. It is a noble patch of forest, broken only here and there by localities which well might be called parks, not for the reason that the parks in Colorado are so named, but because their variations in landscape have a semblance of cultivation. It is unlike the forests of Northern California, Oregon and Washington territories, where red-wood of dense growth predominates, in being interspersed with little valleys, glades and mountain nooks. There are also areas bordering on the San Juan, and in parts of the territory of Colorado, yet remaining as possessions of the government, so far scarcely touched, and it is to be hoped they may forever remain untouched by the advance of settlement. And here I would remark that it would be well to institute investigations, looking to ascertaining what influence these areas of forest have upon the local amounts of precipitation within their immediate areas.

It is stated in the report of Humphreys and Abbott upon the hydraulics of the Mississippi, that "the removal of forests on mountains will tend to increase the amount of rain, by creating heated upward currents," thus leading to more frequent and violent floods and freshets in the basin of that river. Observations have been made upon phenomena that bear upon this question, and the matured results will appear in the final reports.

It has been frequently noted that in the latter parts of each sunny day, from three to six in the afternoon, a collection of at first fleecy and then cumulus, and afterward nimbus clouds, concentrating toward mountain peaks, occurs, and a precipitation at the crests is noticeable, while at lower levels, say if the mountains are 10,000 to 12,000 feet above the sea, at altitudes between 6,000 and 7,000 feet there is usually no rainfall at all. The connection between the intensity and direction of the electrical currents of the earth's crust, and the hygrometric relations of the atmosphere in such instances, is unquestionably intimate, although at present not fully explained. The facts gathered in relation to water supply above and below the surface are many, and afford satisfactory evidence regarding points at which artesian wells may be successfully sunk, and localities where, by directing the total aqueous precipitation in proper channels of irrigation, arid fields may be made arable. The data gathered in relation thereto will be augmented from year to year by more extended examinations.

NATIONAL ADVANTAGES OF THE SURVEY.

I would endeavor to impress upon your minds the importance of these surveys in regard to their uses to the government. In so doing, I may have undertaken too much, since I am but an humble worker in a small fraction of this great field; yet if one sets forth the plan, wherefrom has grown to the War Department the economy promised in the early stages of this work, one might well be pardoned for venturing upon the yet untrodden fields from which other portions of the government might gather fruit.

To say that the maps of the interior of this country are fraught with numerous errors, is to tell you nothing new. To tell you how these errors may be overcome and rectified were indeed a noble task, but he who accomplishes a remedy, while remaining true to the economical interests of the government, deserves and will receive credit at the hands of all. In the great domain at the West, in advance of settlement and of the acres thrown open to occupation by advancing civilization, the government still possesses lands of which little is known, large parts of which no one representing the government, except now and then a desultory scout, has ever traversed. Into these regions War Department explorations have been sent. Their practical value at the moment may not meet the wants of the settler or the operator, but it is necessary to the government that the place, size and natural and other resources of these tracts should be fully understood, because of present and prospective operations through them, and because of their subsequent entry and sale to parties desiring to avail themselves of the homestead right, etc.

Into these remote, inaccessible and often dangerous regions, parties of the survey under my charge have entered, seeking to evolve practical results from the problems intrusted to them. And what are some of these practical problems? it well may be asked. That from a purely governmental necessity these refer to a delineation of the surface and a description of the resources of the area surveyed, can be easily understood, while from a broad national standard grows the desirability of investigating further into scientific questions, solely bearing upon the distribution of forms in natural history, and in a discussion of the structure of the earth's crust, from stratigraphical and other known relations, and perhaps a practical application of the information gathered to the wants of man.

The great secret of solidity for a work of this nature must grow, however, from the fact that the useful information gained, repays its cost, granting which, upon this as a foundation may from time to time cluster the labors of the scientist engaged in advancing inquiries

in special fields beyond the present domain of knowledge, wresting from nature hidden truths, to formulate them into a "law," nevertheless the mission of the *Engineer* remains the same, and in its simple way should apply all that is great and all that is small of formulated science to the practical objects had in view.

Making maps of the interior, scientifically accurate throughout all their parts, has not as an original proposition been attempted until late years. Our admirable organizations, the United States Coast Survey, United States Lake Survey, and River and Harbor Surveys, answering special purposes, and the expeditions for exploration and survey, and more lately the land surveys have been the principal sources from whence have grown the authentic maps of the country, and little question has ever been raised as to the expenditures made for carrying on these great works, but the utility of furthering extensive schemes of survey founded upon a broader policy, of the great interior, west of the Mississippi, has repeatedly received an apathetic hearing at the hands of Congress. The only method of securing a permanent position for a survey organization, it seems to me, is to place it as a subject to the needs of a department of the government, fulfilling which it will reach phases of economy to interior sectional interests, and with it will grow a policy co-equal with the wants of the government, so settled and lasting as to bring to the support of enterprises under it in course of time many of the best educated minds of the country, whether military or civil. While writing my last annual report, some of the uses and needs of these explorations and surveys to the War Department came into my mind and were recorded as follows:

1st. The published maps, profiles, and compiled distances over present and future routes of communication and supply that look to a saving in cost of transportation of all materials and munitions of war and other supplies forwarded through the Quarter-master's Department of the army. As a correct understanding of the topographical features of a country is necessary to all military operations, either in times of war or peace, the necessity for the acquisition of this information in a systematic form at the War Department, and its dissemination through the different branches of the military service, becomes apparent.

2d. The establishment of routes of communication necessary for the supply of interior posts. For an understanding of the above, the inter-lying country requires thorough examination.

3d. Critical routes to be followed in the interchange of troops between distant stations when demanded.

4th. New and shorter routes for forwarding recruits to their companies and stations.

5th. Routes for scouts pursuing hostile or unfriendly Indians.

6th. The selections of sites for new military posts established in advance of, or as safeguards to, civilization.

7th. Routes for troops when called out for the protection of miners or settlers.

8th. A knowledge of the resources of the country surrounding the military establishments, and its capacity for furnishing supplies.

9th. Routes of transit when troops are ordered to remote points in aid of the civil law.

10th. A knowledge of the character and habits of the several Indian tribes, and their disposition toward each other and toward settlers.

The above are a few of the classes of examinations necessary and valuable to the several Bureaus of the War Department and to the commanders of troops in their pioneering into the unoccupied and comparatively inaccessible portions of the western interior.

To obtain such information that should be at all times immediately available for the uses of the War Department, such observations as are necessary for an *accurate delineation and description of the surface and resources of the area surveyed* must be made. This calls for geographical surveys in their highest and broadest sense.

The advantages to industrial interests growing from the examinations made by a body of skilled men, mobile enough to be dispatched with little warning to any region west of the 100th meridian, no matter how remote, and sufficiently stable to successfully accomplish required objects, is not likely to be overestimated. That the Department, supervising their duties, requires immediate results is a guarantee to an activity that is advanced by a species of discipline, without which certain if not all features of an expedition might fail. The necessities of the army as protectors of and as a nucleus to advancing population in the west has so deeply rooted itself in the popular mind of those sections as to render it unnecessary to dwell upon the benefits coming from the continuous exploration which forms no little part of its duty. It is believed that the standard of geographical work established in the past few years will, if energetically continued, add an increasing amount of enthusiasm to emigration and to the legitimate establishment of the great industries, from the systematic information rapidly acquired and made as speedily as possible accessible to the public. When we may reach a policy that surrounds with an entity of relations, the standard accepted for the work, then the

economic problems of the routes traversed, and the areas occupied may one by one be anticipated and practical results evolved. Until finally from the application of the highest principles of Geodesy to the gathering of the simplest detailed facts, the surveys of our interior will be constantly advanced until there shall be reared to Geography a proud monument at whose base shall lie the mighty domain that is our inheritance as a government, the States and Territories of the United States of America

X.

EXPLORATIONS OF THE TERRITORIES.

BY LIEUT. E. H. RUFFNER, U. S. A.

(Communicated.)

HEAD-QUARTERS DEPARTMENT OF THE MISSOURI, }
OFFICE CHIEF ENGINEER, }
PORT LEAVENWORTH, Ks., Oct. 10, 1874. }

SIR:—Under date of July 24, 1873, you were kind enough to address me, inviting correspondence and a coöperation with your Society in its general object of collecting geographical information, and with a specific view of calling the attention of foreign societies to the labors in that direction of army officers. At the time you addressed me I was on the eve of leaving for New Mexico, and after my return I was so fully occupied through the winter, and by a long absence in the spring, that I did not have time to write to you as fully as I desired to do, both on account of the importance of the subject and on account of my desire to present myself fully and correctly to you. With this preliminary apology for waiting I shall proceed to present you with a full view of the aims and operations of this office, thus enabling you to judge in what manner I can best subserve the interests of the Society, and best accomplish your generous desire to represent fairly the accomplishments of a body of hard-working and faithful men, such as the United States Army has continually proved itself to be in the far west.

The engineer officer of the department of the Missouri, comprising the States of Illinois, Missouri and Kansas, the Territories of Colorado and New Mexico and more than half of the Indian Territory, an area nearly equal to that of all of the Atlantic States, certainly

has a *field* of operations sufficiently large to afford room for progress. Were there at my disposal means sufficient to cover any one desirable field of investigation, that alone would give work enough without attempting to cover all that was possible or even desirable. As it is, however, it would be impracticable and almost premature to attempt more than to meet the ordinary demands of the military service which, in itself, is ever changing in field and requirements, and which has made a quiet improvement in geographical information likely to escape attention, unless especially invited to it.

GENERAL PLAN OF WORK OF OFFICE.

It has been thus my practice to confine the labors of this office in its topographical and geographical department almost exclusively in meeting or forestalling the needs of the military service. Since the close of the war there had been little attention paid to an old regulation of the service requiring troops while *en route* to keep a journal showing the topography and military capabilities of a country passed over. This I called up again some four years ago, preparing for explanations of the method circulars describing how to take the notes, and furnishing instruments, an odometer for distance and a prismatic compass for direction.

While waiting for the system to commence its workings I began the compilation of existing authorities, standard maps, United States land surveys, railroad and other surveys, into skeleton maps intended eventually to make a map of the entire department, to be altered from time to time as authority was given by new sources.

With this general plan in view I made special efforts to accompany and profit by any military movements of any magnitude.

After a careful working of this system for so long a time the results accomplished are well worth notice.

KANSAS.

The first thing, namely, to prepare skeleton maps showing only what was well known, and to be used in the future for addition of new matter, was first done with reference to Kansas, and in the spring of 1872, as the result of much labor in compilation, I published campaign maps, on a large scale, of such portions of Kansas as were covered by the land surveys. Assisted by these, the troops became interested in recording all topographical features encountered, and at the close of the season I had on my maps the houses even of all the frontier settlements.

During that season the cavalry scouted incessantly in the vicinity

of the frontier settlements which were continually spreading to the west, and served as their protection and as a warning to the Indians. In the meantime the land surveys were being vigorously pushed west by the energetic surveyor-general of Kansas, General C. W. Babcock, and during that fall I assisted in determining the telegraphic longitude of Wallace, Ks., as a preliminary to the location of the west boundary of Kansas, the twenty-fifth meridian from Washington. I also sent out that season a surveying party to examine the headwaters of the Republican river, a region at that time likely to be frequented by Indians. During that summer the rapid building of the Atchison, Topeka and Santa Fé railroad up the valley of the Arkansas river entirely changed the military situation. The Kansas Pacific railroad and the center of Kansas became covered, both north and south, and incursions by the Indians were soon detected and remedied, and since that time that portion of Kansas has been quiet and progressive.

The influx of settlers now became more directed toward the southern border of Kansas, and during the season of 1873 the cavalry had the more difficult task of keeping south of the boundary the wild Cheyennes and Arrapahoes, tempted to depredations by flocks and herds coming alluringly near their reach. From Fort Dodge and Wichita the cavalry scouted incessantly that season and with the same topographical gains. As immediate results of all these causes the map of Kansas has been so elaborated that we now may be considered to possess practically perfect details. During the spring of 1873, I issued a first edition of one of the sheets of my map of the department, embracing the west of Kansas, south-west of Nebraska, east of Colorado, and north-east of New Mexico. At that time it contained more than was found on any one sheet of that section of the country published, and it is still the best military map extant of the greater part of our Indian region.

COLORADO.

During the summer and fall of 1872, troubles were threatened with the Ute Indians of Colorado, on account of the influx of miners upon their reservation, into the so-called "San Juan" mining district. Troops occupied a part of the country, and in 1873, orders were received from Washington directing that the miners be ejected from that reservation. The country was only very slightly known, and I was in vain called upon for information thereof. I organized a party to accompany the troops, and make as thorough a survey of the country as could be done.

Fortunately the Indians that summer ceded to the United States the country in dispute. The expedition was postponed, but my party was engaged all summer on their appointed work.

A report was made in February last, and was printed by Congress. Of the importance of this survey, I would speak a word.

An instrumental line was run by "Stadia and Azimuth" from Pueblo, Colorado, over the mountains to Fort Garland, thence up the Rio Grande to its head, and over the divide to the waters of the Pacific slope, the Animas river, a tributary of the San Juan, which flows into the Colorado of the west; then back and over the divide again to the headwaters of the Gunnisons or Grand river; thence up these waters to their head, and for the fourth time over the divide to the headwaters of the Arkansas river, down this to the place of beginning. Starting from Pueblo, the longitude of which was determined by me, and closing on Lebran, which was an astronomical station of Lieut. G. M. Wheeler, this line of 525 miles crossed five high divides, one 12,210 feet, was uninterrupted, not "checked" by reference to any other well-known point, and yet the error at closing was so small as to be almost startling!

It being the first time this method has ever been used in the mountains, I am justly proud of the achievement, and consider it a great step in bringing to the public notice the adaptability of the stadia instrument for fine and quick work in difficult country.

The report forms a volume of about 100 pages octavo, and is accompanied by a map.

The publishing of the report, and the general attention attracted to this region of the country, has drawn thither all the various exploring parties now operating in the mountains of Colorado.

NEW MEXICO.

In 1871 and 1872 there was little of interest accomplished by the military in New Mexico, until the attempted establishment of an Apache reservation on the Rio Tulerosa, brought into notice a portion of the country very slightly known. Of an interesting character, solely on account of wild mountains and sterile plains, no attractive mineral or metal had drawn thither the restless whites, who are always the first to bring into notice regions of supposed economic value. An attempt to induce, or, failing that, to compel the wildest of wild Apaches, to make a permanent home in this "abomination of desolation," made the movements of cavalry in this vicinity to be almost incessant for the past two years, but by my system their

routes are carefully marked, and the web grows finer as the warp and woof of cavalry trails increase in number.

During the summer of 1873, restlessness, and finally a general flight from their reservation of the Indians at Fort Stanton, called for action in this quarter, and again the ubiquitous cavalry appeared, in every nook of the Guadalupe and Sacramento mountains, on all the habitable edges of the staked plains, and up and down the Rio Pecos, and still the patient fingers of the "recorder," even on the long "night march," jotted down "the water" and the "dry prairie."

During 1872, a determined and successful effort was made to stop a contraband trade carried on over the "staked plains" by "comancheros" buying stolen cattle and horses from the Texas Indians, and selling to the Colorado and New Mexican borderers. A succession of scouts was made on the edge and over the staked plains in the "pan-handle" of Texas, and one of these gave us the clearest description and best map on record of one important clear-water stream deeply canoed in the great Llano.

I felt encouraged by such progress, and issued, in the fall of 1873, an edition of sheet No. 4 of my map of the department, this being the Territory of New Mexico. Though of course very imperfect, this is yet acknowledged to be the best map in existence of that Territory.

Already since its issue, have I been enabled to collect and send to Washington a volume of maps of roads in New Mexico, surveyed since, and giving important additions.

As if the rapid shifting of the military scene from the north to the south of Kansas, thence to Colorado mountains, and thence to New Mexico, and thence even for a short incursion last fall of rioting Comanches up into Colorado, even so far that the summer visitors and fragile invalids at Pike's peak and the "Garden of the Gods," had troubled dreams of war paint and war whoops; even if this were not sufficient change, this year we are hurried off to the Indian Territory.

INDIAN TERRITORY

This Territory, for some time kept sacred from military operations, beyond the occupation of Fort Sill and Camp Supply, was under the fortunate circumstance of being surveyed by the General Land Office; and though sometimes interfered with, even to the death of a few of the surveyors, progressed very rapidly, and is now nearly complete, especially in the western portion, that part most interesting to us.

These land surveys are published by the Land Office only in the shape of an index map, and to be utilized for military purposes, copies must be obtained and the whole redrawn on a suitable scale. This I have been doing for the past three years, although not strictly in my line of duty, as the Indian Territory had been withdrawn from this department. But as the greater portion was retransferred this summer, my labor became of immediate service.

A large expedition is now operating in this Territory, and on the borders and over the staked plains, through the deep cañons and over the bleak mesas, and the Engineer Officer of the Expedition will furnish much that is interesting and useful as to the structure and features of this region — information which will possess much practical value if not of the highest tone of scientific air.

SUMMARY FOR 1873.

If this brief review of the course of military events does not show a certain amount of labor in acquiring and also in sorting and sifting geographical data, perhaps the figures 22,929 miles of marches of troops, special surveys and reconnaissances in this department during the season of 1873, of which journals are on record in this office, will give a clearer idea of the army, its officers and men, their privations and labors, and at the same time the results accomplished by them in developing our "Great West."

Of special work done by this office, I may mention surveys of reservations, military and Indian, surveys for roads and their construction, astronomical determinations, and any similar work.

During the spring of this year I was engaged for four months in constructing a wagon road from Santa Fé N. M. to Taos, an important connection between the north and south of the valley of the Rio Grande. A survey was made at the same time for a direct wagon road from Fort Garland to Fort Wingate.

A list of the various maps and publications of this office during the past four years may be of interest.

MAPS PUBLISHED ENG. OFF. DEPT. MO.

Date.	Title.	Number of Sections.	Scale.
1872.	Campaign Map of Kansas.....	5	250,000
1872.	Roads from Fort Dodge to Camp Supply....	1	250,000
1872.	Fort Leavenworth Reservation.....	1	60,000
1872.	Vicinity of Fort Tulerosa.....	1	1,000,000
1873.	Department of the Missouri No. 2 and 4....	2	1,000,000
1872.	Chickasaw Nation and Contiguous Country..	1	250,000
1874.	Reconnaissance in the Ute Country.....	1	500,000

Besides these maps have been printed astronomical reports on the determination of the longitudes of Fort Leavenworth, Ks.; Fort Hays, Ks.; Fort Wallace, Ks.; Denver, Colorado; Pueblo, Colorado; and also printed report on a reconnaissance in the Ute Country, 1874.

There are now in manuscript in this office, maps of Kansas and Colorado revised, and a large map of the Indian Territory, which is being prepared for the engraver, and which will be issued sometime this winter, it is hoped.

If it is thought from this resumé that any of my publications will be of interest to the Society, I will be glad to send copies of any issue that may be available, upon notification from you that they will be acceptable.

AIMS OF THE OFFICE.

It has not been the object of this office to search for wild scenery or for bones of still wilder saurians, to climb peaks, or publish exhaustive reports on what is intended to be done next year. With small pecuniary resources, amounting to only sufficient to employ requisite draughtsmen and computers, no attempt has been made at general exploration. To have on record clear descriptions of roads and their capabilities, country and its resources, "wood, water and grass," to make maps which will show when the troops can travel and when they have traveled, and to keep these maps up to date, and to improve old and suggest and examine new communications, have been the prominent aims, and, if not of much scientific interest, are believed to be of economical value.

As proofs of the labors of the officers and men of the United States Army to fulfill a difficult duty, in which rest and ease, luxury and comfort are unknown terms, while ceaseless activity is the counter-sign, and the barren and arid plains are as willingly encountered as the snow-clad peaks of the Rocky mountains; as proofs that in the midst of rough and rapid marches there is still a willingness to perform a duty in recording notes which might be thought at the time unnecessary; and as proofs of the importance and value of a simple system carefully and persistently carried out, my records are conclusive.

I am, Sir, very respectfully, your obedient servant,

E. H. RUFFNER,
First Lieut. Engineer.

ALVAN S. SOUTHWORTH,
Sec'y Am. Geog. Soc., N. Y.

XI.

ADDRESS.

BY MR. ALVAN S. SOUTHWORTH, SECRETARY OF THE SOCIETY.

THE NEW STATE OF COLORADO.

FOUR MONTHS IN THE ROCKY MOUNTAINS.

MR. PRESIDENT, FELLOWS OF THE GEOGRAPHICAL SOCIETY, LADIES AND GENTLEMEN:—I shall speak to-night of the new State of Colorado. During four months of the past summer, I made a horse-back ride through the most attractive regions of this, the thirty-eighth State of the Union, accompanying Dr. Hayden on his expedition, and the Doctor personally on his sub-expedition to the Elk mountains. This eminent explorer had invited me, as the representative of the Society, to go with him to see in what manner, and with what results, he conducted exploration in the great west. That which I shall tell you to-night is, therefore, the record of a semi-official journey with the Hayden expedition; and in performing this pleasant task, I endeavored to steer equally clear of captious observation, verdant enthusiasm, and popular fallacy.

THE HEART OF THE CONTINENT.

Let us consider the heart of America. It is a vast mountainous region, comprising the territories of Wyoming, Utah, Arizona, New Mexico, and Colorado—one-eighth of the territorial domain of the United States. Indians, Aztecs, and Spaniards, are the only races of men who have left their traces on this region; and the ruins which mark their ancient habitations are quite as mysterious as those

which, from year to year, are being excavated along the banks of the Nile. The population is more than mixed; it is beyond exact classification or enumeration. It is safe to say that it comprises 340,000 whites and Indians, the latter reaching as high a figure as 50,000. With the exception of the Mormons, who settled on the shores of Salt Lake in 1847, to escape persecution and enjoy their peculiar institutions, and the relics of the old Spanish settlements, the whites are either emigrants from the old world, adventurers in search of gold, invalids repairing shattered constitutions, eastern farmers tilling a more culturable soil, and raising richer breeds of stock than are found on our slope, or social outlaws from the Atlantic seaboard. The nationalities preserve their native marks. The Jew is the same diligent, sober money-getter we see about the Bourse of Vienna; the Frenchman opens a restaurant, and flings out a sign, "Delmonico of the West" or "Maison Dorée," and is ever a worthy component part of the new community; the German loses a little of his fatherland solidity, and now and then catches a breeze of the enthusiasm constantly blowing there; the Irishman, who is not generally of the higher type, exhibits both the aggressive and kindly characteristics of his race; while the American takes chances in every thing, from political power to blacking boots, changing his occupation according to the shifting phases of fortune. There is not in this compound body politic any pronounced religious fervor in any direction. Churches there are; but they find stronger support in the gentler sex, than among the busy men, whose lives are devoted to unflagging industry in secular pursuits. The Jesuit fathers have done noble work among the Indians; but, like all spiritual labor among aboriginal races, permanent effect could not be secured without abundant and continuous material generosity. The typical Indian is as far removed from the pen-creation of Cooper, as the Italian lazzaroni is from our conception of the Roman gladiator. He is in no sense a hero; there is not a particle of epic "stuff" in him, whether he be a Cochise or a Colarow. Ages ago he may have belonged to the nobler races of men, but such is not the fact now. As he exists at the heart of the continent, he is a dependent on the government, clad in the ludicrous costumes furnished by civilization, retaining an indifferent regard for the traditional habits of his ancestors. Fidelity, except in individual instances, is rare; of ambition there is none. The Indians simply crave supplies, pass their aimless lives awaiting death, which generally comes to them through that terrible Indian destroyer—rheumatism. While strongly reprobating the inhumanity of the settlers toward these Indians,

and the needless cruelties which they have sometimes suffered from the soldiery, their only usefulness to themselves and their surroundings can be found in stern treatment from a practical standpoint.

The daily life is not unlike that of all new countries. For the active there is little sleep. This arises from the desire to acquire fortune rapidly; for almost every new-comer will assure you that he longs for money only to return to the east and enjoy it. But the percentage of those who carry out this dream, when able, is very small. The manner of getting money changes the manner of the man. He gathers to himself his stipulated sum, closes his business, and returns to New York. Old associations are gone; the hearty manner of the west he can only find in the vestibule of a metropolitan hotel; the newspapers seem stiff and over decorous; the social laws savor too much of formality and coldness, and there is everywhere an absence of personal contact. He returns to the west, and thereafter is at home. Without this inevitable change of feeling, there would be no pronounced foundation upon which to build the structure of a durable western society. Better, then, as it is.

THE LOUISIANA PURCHASE, AND HOW WE ACQUIRED IT.

Alexander VI became Pope in 1492. He farmed out the world with a prodigality which in our day is amusing. The undiscovered regions of the earth he quietly assigned to the Portuguese and Spaniards, provided they would keep on opposite side of the same meridian — that line of longitude running 370 miles west of the Azores. Ferdinand and Isabella acquired, by that stroke of the pen, the western hemisphere. Grants in those days were indeed generous. To give away a continent was a nice present from the supreme ecclesiastic to a royal devotee. Three hundred years later, Thomas Jefferson bought of that grant, what is now the fairest region of North America, for \$15,000,000 — a sum that does not now equal the working capital of a superior business corporation. Viewed as a business enterprise, what are the profits? In the answer is concerned the debt that posterity owes to one of the subtlest minds that has ever influenced the progress of christendom. Nine States and six territories, with almost inexhaustible resources, foot up the profits of the transaction, and they constitute a property which could not be estimated by any standard of money measurement. It is enough to say, that the acquisition now nourishes in peaceful and flourishing homes millions of inhabitants. The acquisition of Louisiana was a bold usurpation, an emphatic expression of the one-man power. Let Jefferson speak for himself, and in the peculiar forms of construction then in vogue:

"The Executive, in seizing the fugitive occurrence which so much advances the good of their country, have done an act beyond the constitution. The legislature, in casting behind them metaphysical subtleties, and risking themselves like faithful servants, must ratify and pay for it, and throw themselves on their country for doing for them unauthorized, what we know they would have done for themselves, had they been in a situation to do it. It is the case of a guardian, investing the money of his ward in purchasing an important adjacent territory; and saying to him when of age, I did this for your good; I pretended to no right to bind you; you may disavow me, and I must get out of the scrape as I can; I thought it my duty to risk myself for you. But we shall not be disavowed by the nation, and their act of indemnity will confirm, and not weaken the constitution; by more strongly marking out its lines." Vol. III, page 521, Jefferson's works.

This language might have been studied with advantage by those who bewailed the extra-constitutional measures by which the Union was saved during the bitter campaigns from Sumpter to the Appomattox tree. In it may be found at once the genius and daring of a mind determined and prophetic. How the times are changed since those words were written! What a difference between the purchase of Louisiana and the buying of Alaska! Then negotiations were long and tedious; the transit of the sea, by canvas, carried the diplomatist to the scene of a general European war; the transfers of principalities and kingdoms would have justified a real estate exchange in the throne-room of the Tuilleries, with Napoleon as proprietor and Talleyrand as auctioneer. In our own country the seat of government was many days' travel from the chief cities of the Union. The juvenile republic was ringing with the bitter animosities which always hang over the early days of experiment in government; Jefferson himself was beset as by a pack of vicious hounds; the press was simply mad. But the keen, unswerving sage of Monticello saw that the guillotine which made a victim of Louis XVI, on that day committed to the destiny of the Union that domain which he purchased and added to the territorial grandeur of the United States. Seventy years later Mr. Seward bought Alaska. But what a different purchase!

THE PHYSIQUE OF WOMEN AND CHILDREN.

The Ute pass is a high-walled cañon, leading into Bergen's park. Passing over the narrow way, built like the ancient military roads of Rome at the Iron Gate of the Danube, we entered a beautiful

rolling country, now being rapidly settled by the Nomadic pioneers. The first ranch that we visited was ten miles from Mainton. Its modest structure, by the road, was inhabited by an elderly woman and her famous daughter—the Colorado *Equestrienne*, who, as a “clothes-pin-fashion” rider, had carried off the prize at the Denver fair. Her mother gave us a long account of her daughter’s accomplishments in the saddle and without the saddle. Although at the time the recital seemed intensely ludicrous, I afterward found that the younger women not only ride whenever practicable, but generally adopt the manner of the man. The climate, the wagon roads and trails, the high-bred and alert horses, to say nothing of the mules, all favor the woman as an *Equestrienne*. No spirit of emulation is so keen among the young ladies as in a race for the lead or a dash for a prize. They glow with excitement and anticipated pleasure, at the very mention of horse-back riding; and I do not know that even English ladies excel them in their love for this healthy exercise. In what charming contrast is this taste with the indoor, parlor recreations of the American young ladies of the eastern States.

In Colorado, among the fair sex, the *physical* complements the literary and household recreations of the Boston school. A physician there is not a must-be—the young are not acquainted with the subtle poisons and enervating drugs, long before they have reached the adult physique. Alluring luxuries have not yet seduced them from the hardest and noblest of Saxon pleasures. In all of this it must be allowed there is a fine harbinger for the future. Profound students of Sociology have told us of the constantly diminishing stature of the French; those who have examined the brief existence of the mixed race in North America have traced the gradual growth of all manner of constitutional disease, attributable to wrong-living and lavish mental exertion. None of this decay can be observed among those who carried good health to the territories flanked by the Rocky mountains; instead, there is added strength and power. The proof is in the children. They are uniformly healthy, and, curious fact, are uniformly blonde, regardless of the complexion of their progenitors. These little ones are rotund of figure, with a soberer spirit than the Latin, a greater juvenile solidity than the eastern child.

To me, almost without exception, every child was a prime Saxon. Is it impossible that these flaxen-haired juveniles may not mature into a race as able in physique and as conservative in inclination as the Barons of medieval England? The mother is little perplexed there, as to the future of her offspring.

A COLORADO RANCH.

The ranch was my study. The settler arrives from the east, and taking advantage of the Homestead law, he fences off 160 acres of land and pre-empt 160 more. He builds a comfortable two-story cabin, with five rooms, for \$500, and begins to buy stock at \$25 a head. Stock raising and not farming is his business; and by industry in this branch, he will probably at the end of five years find himself in the possession of that which in cash is worth \$10,000. It should be understood that the land he holds by right of possession is not surveyed as yet by the Land Office, and hence his ranch, in fact, covers often thousands of acres. Every ranch is a hotel. The owner holds himself in readiness to house and feed the traveler at moderate rates, and this is no inconsiderable source of his revenue. The houses are always neat, papered with New York *Heralds*, *Times*, and *Tribunes*, *Harper's Weeklies*, and other eastern journals.

THE STATE OF COLORADO.

Railways.....	024 miles
Railways to be completed in 1874.....	544 miles
Since 1871, public wealth increased from \$20,000,000 to.....	\$70,000,000
Under cultivation.....	200,000 acres
Gold and silver mining.....	\$5,000,000
Coal mining.....	\$1,000,000
Stock raising.....	\$2,000,000
Wood, lumber, and dairying.....	\$2,000,000
Irrigable land.....	3,000,000 acres

Colorado is now considered the richest State in the Union in iron and coal.

BERGEN'S PARK.

The park-plots of Warwickshire, and the fairest, wooded swards of Middlesex, could not be more impressive and suggestive of a quieter, sublimer pastoral beauty than Bergen's park. It lies just to westward of Pike's peak—not a day's march beyond the Ute pass. I think I wandered through its colonnades of majestic pines under peculiar advantages; the idea of estate, of vast personal domain, of some of Scott's medieval forest scenes, with great mountains, silvered streams, and enchanted dells, was there. It brought to the mind not the vague day dreams of the sentimental idler, but a thousand events of travel, strains of fascinating music, marching and counter-marching armies, vivid recollections from the canvas. What a world of magnificent solitude there was around us! A rainstorm, as sudden as violent, had come and gone, as we entered the lofty timber, leaving the natural lawns sparkling in the sun. The huge forms of

the noble trees, rising like shafts crowned with laurel capitals, were grouped in grove-like clusters over the rolling country; and here and there in the open could be seen the granite and precipitous face of Pike's peak, mellowed with the hues of the rainbow. The sharp outlines of the Park range, the sullen retreat of the rain-cloud over the jagged summits, the unveiling of a soft and cheerful sky, were mere details of the scenic transformation, accompanied by the music of the swift streams. To call regions like this one a park is a feeble bit of nomenclature. With nothing dismal, with none of the glamour of the Black Forest, there seemed a faultless arrangement of episode, a marvelous naturalness of landscape gardening, a variety and perfection of nature itself.

CAMP LIFE.

The close of a long day in the mountains is hailed with the supremest joy. The overworked and nigh-worn-to-death boy who walks from above 59th street to the City Hall park every morning before eight o'clock, and does constant pedestrian duty till sunset, is not happier to lay aside his toil. The fatigue of ten hours in the saddle, going from peak to valley, is perhaps healthy in the end, but, as the closing hours of the day draw on, a hungering for repose is evident in the serious mien and silent lips. The pack-train does not come to its camping ground, therefore, with the joyous hilarity, the flux of spirits, with which it set out in the morning. If the march has been a serious one — thirty miles up hill and down dale — the mules are jaded, the horses catch at the green shrubs for a passing bit of provender, and the packs seem cruel burden. The head-packer, the all-in-all of the expedition, assumes the gravity of the executive officer of a ship bringing the vessel to anchor in a protected roadstead. Like the seaman, he must ignore the men, and consider the cargo and transport. His first anxiety is water. The camp must be pitched beside a stream. He must have timber for the cook, grasses for the animals, and a mountain-locked park, so that they cannot wander to a fugitive distance; for, by sunrise, they must be again at our tent doors. Such a place "Steve" found one evening on the bank of the Roaring Fork. The men descended the side hill of a deep gulch thickly timbered with spruce and pine; in the bottom below were acres of waving grasses, and here and there the conical Indian lodges, showing that it had been a favorite rendezvous of the Utés. The head of our train, with John mounted on his large bay horse, forded an arm of the Roaring Fork, and a mile to southward, at the foot of a steep mountain, the "outfit" came to a halt. Alternate showers

of rain and bursts of sunshine, common in the elk range, were giving variety to every hour. Just at the moment when we arrived on our camping ground it was rain. John selected a large cedar, under which to build his fire. He unpacked his mess boxes, took them there for shelter, while we all assisted to unload the other mules, placing the cargo in line of battle, twenty feet from the mess boxes, together with the aparahoes, covering all with tarpaulins. The five tents were up in the twinkling of an eye, but not securely fastened. Everybody in a drenching rain who rushes to shelter exhibits good sense. So with our bedding we awaited the passing of the heavily-laden rain-cloud. The sun came out again to say adieu for the day, but its rays were not warm enough to dry the wet grasses. The animals had been turned loose, with long lariats, to graze, the bell-horse keeping up the monotonous ringing which holds them in common company. Often it happens that one, more independent than the rest, wanders off to some secluded and invisible spot to lie down, possibly to reflect upon the miseries of being a mule in active life. When dusk comes on, and the packers go out to picket them at half-lariat, the truant occasions no little anxiety and trouble. It generally takes two mounted men to drive him to the rendezvous. This is not accomplished without a long chase, in which the mule shows that he is as fleet of foot as stubborn of intent. The antics of the mules constitute the most amusing feature of camp life. They are constantly doing the dramatic, the ludicrous, the vicious. The attachment that grows on the rider for his mule is of a far different character from that inspired by the long ownership of a horse. Toward the horse there is a sentiment, even a tenderness, a feeling that mountain work is taking him from his proud estate—the road, and the turf. Toward the mule there is the same sympathy that you have for a good-hearted buffoon or a pleasing minstrel. This is apparent in the names—no one thinks of calling his horse “Hoggy,” “Jake,” “Mollie,” “Bawly,” and “Joe,” as we named our mules last summer.

Our camp is now in order. John is getting the meal ready, and he finds ample assistance; for the cook is the real personage of the camp. All must be industrious; a lazy man had better never join the Hayden expedition. The axes are put into requisition, the resinous pines are felled for the evening camp fire; the packers prepare a place to sleep beneath the tarpaulins; the wounded mules are rubbed with ointment. But some of our party have not yet returned. We soon hear a loud shout from the hill-side, and in a moment we see the grim face of Mr. Chittenden's mule, then the rider, then a dead mountain sheep tied to his saddle, that was the meaning of the

rifle shot we heard an hour ago. It is always an exploit worth recounting, the killing of large game in the Rocky mountains. To every deer there is a different story of his taking off, and we listen with profound interest. Then the head must be prepared for preservation, a sketch must be made of his antlers, and the venison finally be consigned to the cook. It seldom occurred during the expedition that there were night adventures with deer. Upon only one occasion was there a ripple of excitement. When Mr. Shanks lay at the point of death, George Seaman went out to shoot deer, as the meat supply was nearly exhausted. He wandered far from camp up the mountain side, among the thick timber, near the foot of Mount Daly. Night-fall came, and he had just shot his doe. He proceeded to cut a saddle of venison, finding the labor much more severe than he had anticipated. It became pitch dark. There was no direct trail to camp; indeed, the bearings were all lost in the sombre night. We missed his presence, and put more logs on the fire. The great blaze became his beacon, and toward midnight he came in on his jaded mule. Dr. Hayden and other members of the expedition have frequently remained over night in the forests, unable to find the camp. It is then that the night is long.

A picture of our camp beside the Roaring Fork is essentially a picture of all our camps in the wilderness. We have pitched our tents. We have made places for ourselves' around the mess cloth. John is not only our cook; he is also our waiter, and we all eat together. The ceremony begins with a bountiful supply of tea or coffee, followed by the mountain meats, rice, and beans, according to the pleasure of our cook. One by one we leave the feast and gather about the camp fire. Our ambition to make it as blazing, as lofty as possible, is duly rewarded, unless a sudden storm burst upon us. Until ten o'clock, many times until midnight, we have volumes of western reminiscence, when the packers interweave that peculiar texture of fancy and fact which is a peculiar symptom of a western imagination. It is one of the lessons of camp life never to doubt. You must take with you a large stock of credulity, and never permit your supply to become exhausted. You will occasionally get into the cross-examining mood, but a more pronounced emphasis on the part of the narrator will warn you that you are trespassing on dangerous ground. All considered, it is easy to be agreeable in camp. We had none to disturb our harmony. Sometimes, however, there will be a captious spirit who can find no affinity with anybody or any thing, and he stands in contrast to the otherwise monotonous good nature; and thus the life proceeds. In the morning camp is struck

at seven o'clock, and breakfast is finished by eight. The train then moves forward for another day's journey.

DR. HAYDEN.

During my three months in the mountains, from the head of the expedition to the humblest attendant, I experienced the kindness and courtesy of all. Dr. Hayden I found an incessant worker, a daring mountain climber, and a genial companion. In his camp experience with his attendants he recalled the longing of an eminent French philosopher. Said Montaigne: "I envy those who can make themselves familiar with the meanest of their followers, and converse among their own attendants; and I dislike the advice of Plato, that men should always speak in a magisterial tone to their domestics, whether men or women, without ever being facetious or familiar." In remembering this paragraph, I thought how admirably Dr. Hayden exemplified it; for during seven successive years he had substantially the same attendants, all of whom had followed him through dangers and trials innumerable; and there, too, I found his chief executive officer, Mr. James Stevenson, who, on the upper Missouri, twenty years before, had united his fortunes with the doctor's, and together they had since struggled on. Camp life is nothing if not pleasant and charming, as I found it with the Hayden expedition.

INVALIDS.

Two classes of consumptives visit Colorado — those in the incipient stages; those who are "too far gone." The first are invariably saved; the second are invariably lost. There might be a third division, embracing cases of doubtful malignity, and with them it may be said that the larger number are restored to a sound condition of health. There is but one great evil that menaces these unfortunate invalids. They go to Colorado, establish themselves for a brief period in a simple household, eat of the rich cream and cheeses and beeves, roam over the country on horseback, and gradually abandon stimulants. Soon they find their cheeks ruddier, their frames hardier, their arms and legs tougher; fatigue rarely supervenes hard physical exercise; the cough vanishes; their spirits become elastic, and it is all gone; the malady is extirpated in three months. So they think. Vague delusion! They hurry eastward; the business craving is again upon them; the ceaseless, life-destroying ambition to make money draws them back to relapse, which is not long delayed by the eastern climate; and then, if the patient sees that all is over, he lies down to die, or makes a second, but this time fruitless journey to the

West. *It is only the hereditary or confirmed consumptive, who remains in Colorado for a term of years, who is restored; and to this truth I never found an exception while riding through the most populous districts of the territory.*

To those who have made any examination of the sanitary qualities of Colorado, it seems a crime that these restorative blessings have not been more widely published to the world. To a few only have they been made known, and yet hundreds of lives have been saved. Emphatically the Land of Health, Colorado by no means confines all her remedial qualities to the cure of the consumptives. It is, to speak at large, a place to go for repairs—to get your constitution mended, an overtasked brain put at rest, an abused stomach renewed, a morbid tendency cut short. It is one of the evils of resorts for invalids or broken-down men and women that there is no active employment. Different, indeed, is it in Colorado. When one gets on the highway to restoration, he craves labor and finds it—of the pastoral kind—everywhere.

MOUNTAIN FEVER.

The mountain fever had been making havoc with my peace of mind and body for several days before reaching South park. Whether it was the altitude above the sea, the new condition of life, or a trace of malignant fever contracted in Africa, I could not tell. It grew worse from hour to hour, and during my solitary ride from Hall's ranch to Granite, it was with difficulty that I kept in the saddle. I wandered about, seeking distraction, but there was nothing that could divert me from the rapidly gaining malady. At last it came to this: "Should I go on or turn back?" I found a young doctor at Granite. He told me the chances were even—life or death; and as Dr. Hayden thought life the more plausible alternative, and I thought it the more desirable, I came to the conclusion not to abandon the expedition. The eve of our movement toward the mountains, the 2d of August, was my bitterest night, and the last of real suffering. From that date I rapidly recovered, and in a week's time I was myself again.

MINING.

Gold hunting in the territories is a curious, ever-shifting, hardly describable pursuit. While in all countries subjected to the mining fever—Australia, New Zealand, Siberia and South Africa—there is always a grave uncertainty as to the fate of an investment in "prospected" domains, there are yet laws and usages by which all

that the soil or rocks yields may readily accrue to the rightful owners. West of the Mississippi we find another state of affairs. In some territories and communities, where mining has gathered the dignity of a matured industry, organized effort undoubtedly reaps every advantage that belongs to priority of occupation; but even where this organized industry can show a generous income, the Eastern or non-professional investor rarely participates in the revenue. Let us glance at the method of a mine. "Texas Jim," having led a wild life in the plains, flourishing in the palmy days of Julesburg and Virginia City, when he was admired for the number of murders he committed, now having no further means of earning a livelihood, concludes he will become a "prospector." A "prospector" is a gold hunter who has a single jackass, laden with 100 pounds of provisions, a pick and shovel, and a gun. Thus provided, he starts into the Rocky Mountain ranges on a three months' journey, turning over soil here and there, and disturbing granite from time to time. At last he strikes a "lode." He packs back to Denver, tells his story, exhibits his quartz, and sells out his right for a trifle, which sum is soon dissipated at the gaming table. The "lode" now passes into other hands. A mining engineer is authorized to survey and fix the boundaries, and "claims" are duly recorded, in keeping with the law. A stock concern is soon organized; the books are thrown open to subscription; pamphlets with maps on tinted paper are circulated; distinguished writers and wandering enthusiasts are entertained on the spot, and soon the mine of Swindler & Co. is the most wonderful magazine of wealth heard of in historic times. Then one of our citizens here in New York, having some capital unemployed, and his experience in those slow seven per cents or unprofitable real property becoming tedious, thinks he will buy stock in the mine of Swindler & Co. He may lose — he knows that; but the chances are in favor of large gains. He places his money accordingly. Months roll on; highly favorable accounts are received; fresh indications of quartz are reported. The company must therefore expand to meet the emergency. It buys fresh machinery, and in order to do this, an assessment must be made on the stockholders. Now, the organizers and operators of the mine are at the "lode" itself. Without any honest intention of working a genuine and valuable mine, they have actually found a rich deposit. Originally beginning with the intention to bleed Eastern capitalists, feather their own nests, and permit the bubble to burst when there would be no further need for inflation, they have found out they own a pavement of gold. Their next step is to do what they call "freezing out" the investors. They

argue: "Here we are out here, working this mine night and day, while this Eastern fellow has nothing to do but put his profits in the bank. We will freeze him out." They build more works, buy additional machinery, and thus assess the stockholder until he is glad to sell out and rid himself of the whole concern. The property passes into the hands of the original operators. They have swindled valuable works out of the investors, and now probably own a lode worth several millions of dollars. Upon this they fatten to their heart's content. The mine may not always be a lode, it may be a gulch or a placer; and it may not always turn out to be a genuine lode, but only a surface indication. Where knavery has not obtained, ignorance has squandered, vast fortunes. How many instances can be mentioned where great mining establishments, many of them costing \$1,000,000 and upwards, have been built in our territories, upon the belief that underneath was an Ophir and El Dorado, and when the shafts have been sunk, not enough gold to pay the postage on an Eastern mail could be found! It is safe to say, therefore, that a man not on the scene, who invests in an American mine, is almost sure to become a victim. I do not believe that there are a dozen men in New York, having mining stocks in Western enterprises, who ever have or ever will receive dividends. Indeed, nine-tenths of this class of investors have been deliberately defrauded of their money. Many millions of dollars have been sunk in the Territory of Colorado alone in this manner, and it is very doubtful if the gold actually obtained from American mines since 1849, will equal the capital invested to extract it. To be sure, there are hundreds and thousands who have made fortunes in mining. Many gulches have yielded immense revenues, as Alder gulch, in Montana, from which \$40,000,000 have been taken; but this sum has in the main been divided up among small and industrious miners, who, however, always cease their labors when they get enough money to indulge in a protracted spree. It is a part of their code that every good miner must get drunk. Their wages as hired help range from \$2.50 to \$6 a day; but when they work for themselves, if intelligent, they can earn more. In fact, this is the only way by which our far Western mines can be made profitable to honest effort and capital. If a man, intent upon making his fortune, buys an arastra, and sits patiently down and crushes quartz, not dividing his time between labor and debauchery, as the majority do, it is a certainty that riches will eventually be his. All the territories are full of gold; it is only a question of patience, sobriety, honesty and organization to gather it in quantities that will satisfy any one.

DESTRUCTION OF OUR GREAT WESTERN FORESTS.

The extensive and wanton burning of the Rocky Mountain forests goes on from year to year. Perhaps the reckless miners and thoughtless travelers, who are responsible for this prodigious waste, are not aware of their criminal acts by which they bid fair to convert fertile valleys and copious river-sources into arid deserts and dried-up gulches. It is a well-known and long-ago determined fact that forest destruction diminishes rain-fall, and eventually banishes it altogether. Hence the anxiety on the part of all governments to save the native timber intact — knowing that in its preservation and reproduction is the life's blood of the country itself. Our western territories have a large portion of their area now mapped as irreclaimable desert wastes, that can never be made productive except by the slow and expensive process of artificial irrigation. It is fair to presume that these empires of desolation, showing, as they do, alluvial soil, have been denuded of their vegetation and timber by the natural or supernatural incendiary. If lightning has been the criminal, of course there is no remedy; but if the aborigines have been the culprits, I can only observe that they are no worse than their civilized successors. Standing on the summit of a peak 13,500 feet above the sea, my view was obscured by the conflagration of an extensive forest of spruce and pine. A weary prospector in search of gold has turned his solitary animal out to graze, and has built a fire to drive off the autumnal cold. The resinous properties of the timber soon ignite a thousand towering torches, and the wild wind, catching the flame, disperses it over hundreds of square miles of territory. This shameful destruction may go on for months. What will be the result? This rich region will become gradually parched; vegetation will refuse to grow without moisture; brooks and streams will die out forever; the fish which they contain and the game which they water will leave for other haunts; important feeders of a great river system will become extinct, lowering the level, perhaps, of such a river as the Mississippi; and one word will be written across the face of the region — desolation. It is apparent therefore that the most vital question in connection with that wonderful domain beyond the Rocky mountains, is the preservation of forests. Upon their inviolability depend the future homes of "the unborn millions yet to be." While it is possible for one ruthless adventurer to build his camp fire in the wood and leave it to the mercy of the winds, thus laying waste to what would make a respectable county in our commonwealth, the destruction and consequent physical disorders will go on. **Appropriate legislation sternly executed is the only remedy; and let**

us hope that it will find a place on our statute books, and be enforced without fear or favor.

THE ASCENT OF ITALIA PEAK.

The ascent of Italia peak was eventful to me as affording the grandest view I had ever seen — I counted from the summit eight distinct mountain ranges, more than 200 peaks, each over 13,000 feet above the level of the sea, and 500 peaks every one of which was 10,000 feet in height, and the traces of hundreds of streams. Figures like these would have excited my credulity had I not been an actual observer.

In no other mountain range in the world can one see in the limits of one horizon, a corrugated land like this. The Himalayas present gigantic mountains rising 28,000 feet above the sea into regions of perpetual ice and snow; the Andes furnish Aconcagua and Sahama, lifting their frosted cones heavenward over 23,000 feet; the Alps have mounts Blanc and Rosa, each higher than the King peaks of the Rocky mountains; and Mount Ararat itself stands out in the first rank of superior peaks. But from none of these can be seen the stupendous upheavals, the hundreds of miles of terrestrial convulsions, the perfect forest of mountains radiating from that ice-cold summit toward all points of the compass.

We began the ascent at 9 A. M., from the south-east side of the mountain, having followed an Indian trail from Cement creek, where we camped last night. We tied our horses at timber line. The line of ascent was over loose rock tumbled down from the side ridge of Italia by the expansion of ice imbedded in the crevasse. For the first few hundred yards, the approach while not steep was very disagreeable traveling, tearing our boots, rendering creeping a necessity. About 1,000 feet from timber line we reached a jagged edge or divide, which, if not as sharp as a knife, was certainly as sharp as upheaved rocks well can be. We carefully climbed up this edge, feeling our way over split rocks, often loosened from the mass, knowing that an incautious step, or the giving away of a single inch of granite, would precipitate us down the ugly declivity 2,000 feet below. While coolness is the only attribute that gives certainty of life in such situations, I doubt if any one has entire peace of mind. Jokes pass freely; there is a grim smile on every face in the party, but I observe that the muscles tauten, the grip is sure, the caution excessive, and anxiety is not a stranger to the facial changes — not even terror itself. Up and down along this divide, for about 800 feet, finding a foothold, now below, now above, lowering one's self

down narrow chasms in the rock, again hanging by the hands to a strong stratum for a moment's rest, at noon, we finally reach a minor summit, 12,200 feet above the sea at noon. But we were not up yet. This disappointment is the keenest discouragement of mountain climbing; at the base you see at the limit of your upward vision what you assume to be the apex, but it is only a beginning, the true summit revealing itself, when you reach the minor elevation. Dr. Hayden determined, after he had made copious notes, to descend by the same route, mount his horse, make the semi-circuit of the mountain and endeavor to try an easier route than that which lay before us. "You can go that way," he said, "as for me I have no ambition to climb mountains for the pure love of the business, for I have been doing that for twenty years."

Accompanied by Mr. Broadhead, we now began a necessary descent of a rocky gorge, piled up with granite blocks. The progress was slow and perplexing, involving a downward descent of 1,000 feet. This accomplished, without adventure, we passed along the divide, and were at the base of the main peak. Here began severe physical climbing. At every ten steps, so steep was the mountain side, so loose the earth, and sharp the fragments of stone, that we were obliged to stop — "blown." The pulmonary exertions at such intervals were violent indeed, causing dizziness, stomach-sickness, rush of blood to the head; and if perchance you are unfortunate enough to cut your boot into the fleshy part of your foot, the ascent is not thereby sweetened. During adventures like these, a piercing wind, borrowing an icy chill from the snow and ice, penetrates to one's inmost. As panting mountaineers struggling in friendly rivalry, I am sure my companion and myself were not in enviable situations during the 2,000 feet that intervened between us and this summit. Climbing up the bald side, making slow progress, we reached the tip-top, 13,400 feet above the sea, at 2 P. M.

THE GRAND PANORAMA OF PEAKS.

Let us now, beginning to northward and following the points of the compass around to eastward, take a view of this magnificent scene. As I scan the horizon, I can see eight ranges. The Elk Head mountains; the Elk mountains proper — a range eighty miles long; the Sawatch, or principal range of the Rocky mountains; the Park range; the Snowy range; the Sangre de Cristo range; the Uncompagne range — a massive agglomeration of unnamed and gigantic peaks, bounding the southern horizon; and the San Juan group — unexplored. In these ranges are the loftiest and grandest

mountains of the domain belonging to the United States. I do not think I could have a superior point of observation than Italia itself, an upheaval of eruptive, igneous rocks, lying in loose stratification, and discolored by the presence of iron, resembling in their hue the close-grained porphyries of Egypt. At a distance this peak looks like the Italian flag, and is so named because of that fact. On its northern slope, columnar granites rise above their surroundings, forming isolated monuments, loose beds of shale extend into the valley, where I detect two small frozen lakelets. The view, over folds of hills and intervening valleys, extends to northward, embracing Grizzly peak, fifteen miles distant, catching the fading summits of the unknown Elk Head mountain range, one hundred miles away. Spruce, fir, and cedar trees, bearing their oceans of foliage in the brisk wind with peculiar rigidity, are in their dark hues relieved by the lighter tints of the quaking asp. Wooded hills, terraces, and moraines, losing their sharp outlines in the dark and fading distance, make up the scene of comparison and contrast, as the moving and silvered nimbus clouds give an artistic completeness to the whole. Turning slowly to eastward, La Plata, Elbert, and Massive mountains are seen; while beyond there we have glimpses of the famous Park range, itself containing hundreds of lofty mountains. Turning a little more to eastward, and at our feet is the Gunnison park, and the sources of the Gunnison river—a stream winding in all directions, and fertilizing hundreds of thousands of square miles. In all this quarter of the horizon, the number and variety of colors are amazing. Now some peak is touched with a deep carmine or royal purple, and again we find the blank slate color marking the mountains which flank the Lake-Creek pass—the main divide. These mountains, although superb in their structure and altitude, have no name.

Splendid cloud effects appear as I pass with my naked-eye-view still farther to eastward; the fleecy spectres cast deep, dark shadows on the distant ranges, while miles and miles of mist envelop the summits. To southward of eastward are those three gigantic mountains, Harvard, Princeton and Yale, sitting at the edge of South park, bold, sharp, and defiant like those rock-bound colleges themselves. Our pack-train is slowly winding its way over the summit of a hill in my foreground, bound for Italia creek; and fifty miles to the south-east of it, is the Snowy range—not snowy like Blanc and Chimborazo, but just sugar-coated like the crust of a too tart pie. Sullen clusters of timber, populated by the grizzly bear, and containing untold herds of deer and elk, diversify the view, as I

take a glance at the Sangre de Cristo range, all but invisible one hundred miles away. This is a sharp and narrow range, almost parallel with the Great Sawatch range. Again I get a distant view of the Gunnison valley — now a broad, undulating region, that must eventually become a garden spot on this slope. Almost due south is

THE MAJESTIC UNCOMPAGRE RANGE,

unexplored until last season, but since surveyed by Mr. Wilson; there are, perhaps, a dozen peaks in this range above 14,000 feet in height, forming a magnificent barrier against the southern sky. Uncompagre mountain, the king-pin, of all, rises, like a huge dome, covered with ice and snow, but exhibiting dark patches of its granitic foundation. *Los Pinos* Indian agency, where the Indians gather to wage war for flour and general supplies, lies in the open beyond the Elk mountains, while Crested butte, and Gothic mountain, and Washington gulch, are all within an area of fifty square miles. Again, in the dim distance is the San Juan range, also being explored by Mr. Wilson. To westward the peaks are too high and too numerous to permit an extended view, the sharp head of Capitol peak jutting up behind its neighbor, Mount Daly, while Maroon peak, Pyramid, Teocalli, and Castle peaks close up the circumference of the horizon. Such, in brief, is the view of a mountainous region of 60,000 square miles, and the grandest mountain region in the world. Teocalli, named after the sacrificial mound of Mexico, is itself one of the most curious mountains known, seemingly built up in the horizontal strata to the apex; every view of it presents the same appearance of artificial work. Passing along one day with the train, I asked one of our sapient packers if he knew why yonder peak was named Teocalli. "Yes," he replied with ambitious haste; "it was named after Mr. Thomas O'Kelly, who is a well-known prospector in the mountains."

You can, perhaps, imagine from this brief description, a scene enlivened by forest fires perpetually burning; herds of deer and elk running in all directions along the glistening streams that shine like fragments of mirrors in the deep valleys, thousands of feet in all directions; the short crack of the rifle, whose bullet ends the life of a mauve-colored buck or doe; and the movements of the topographer and geologist, instrument in hand, marking the structure and conformation of the extended area.

THE SCULPTURE OF THE CONTINENT.

Our ascent of Mount Daly afforded me remarkable scenes for study.

After penetrating the thick and sharp-pointed branches of a pine forest, completely filling up a gorge, we made our way up the side hill of a long moraine, and continued our journey to westward. Moraines of a long, tomb-like shape are seen in every direction, and there they stand, mournful sepulchres of a once mighty physical age, when the grinding ice, piled up thousands of feet, carved out the valleys and amphitheaters, and, as huge and many-edged chisels, completed the sculpture of the continent.

The lesson of long past infinite ages is so simply and yet so emphatically written upon the country before you that you can trace the history of the earth without effort. Was it not a wise provision of Providence, or, indeed, one of those immutable laws that reveal themselves from time to time, that we can from those upturned strata study the gradual building of the globe? Planetary architecture has, by these mountains, been developed into an accurate science, from which future years will do much to eliminate the mass of speculation outcropping at every point. Yet geology is not the only branch of human study where the fancy must sustain the fact. Human history itself is so complex and confused that it has required the finest intellects of the ages to explain the deductions of 4,000 years of activity, and yet educated mankind is divided as to the results. The Assyrians, although leaving us tablets and abundant hieroglyphic sculpture, buried their alphabet with the decline of their race. Egypt, with her imperishable monuments set like eternal jewels along the banks of her great river, emblems of a stern civilization, unmatched since the lapse of thirty centuries, vouchsafed us no elementary key by which we can read the almost endless hieroglyphics graven on her temples; and in the mysterious Orient, where the human race still dwells in greatest numbers, Mencius and Confucius are placed on the boundaries of authentic history. Turning from this uncertainty and doubt as to our kind, how startling does it seem as we consider stratum after stratum of these Rocky mountain formations we read of the fluidity of the earth, of the age of water, and of creation following creation until we come down to man, finding in each of these chapters historical materials hidden away in the rocks, and which no human being can gainsay or cause to perish, for they are everywhere! And thus has the patient geologist unrolled his scroll of the millions of years that our planet has existed, bringing vividly to our minds the stupendous character of the organism. As I wandered about these mountains every peak was to me a chapter of this history,

every valley a paragraph, every rivulet a phrase — all combining to make a text for which no alphabet but the eye can ever find application. Mountains, I know, are common enough — impressing you as a phenomenal. But there was an empire of them. So many, in fine, that were you born there, anterior to the age of railroads, a plain or level country would be a natural wonder.

MOUNTAIN NAMING.

The most difficult work of the expedition was in finding appropriate names for mountains, streams and parks. Heretofore, the system of nomenclature has largely followed the tide of politics. When Mr. Colfax was at the zenith of his popularity, he was made illustrious to an extent too ludicrous to be believed. Fremont is probably celebrated twenty times; General Grant has more than a dozen geographical monuments. Probably the most astonishing use of proper names is in the case of Mr. Laramie, an enterprising Canadian trader. We have the Laramie range of mountains, a gigantic upheaval; Laramie Plains, Laramie City, Mount Laramie, Fort Laramie, and the Laramie division on the Union Pacific Railroad. This plurality is not always pleasing. Professor Guyot, the venerable and distinguished geographer of Princeton College, is the victim of a small peak in North Carolina, and justly honored by a noble one in the Rocky mountains. The former, named without his approbation, he ignores; but the latter Dr. Hayden selected as a deserving tribute to his great attainments. A noble mountain in the Elk range was named after our President, Chief-Justice Daly, in recognition of his eminent services to science, which you, Fellows of the Society, can so readily indorse and applaud. But the lavish distribution of proper names over the face of the country is a vicious principle, inducing confusion, and perplexing the student. Yet it will go on until some patient scholar shall sit down and tabulate a comprehensive system to be adopted by the government. Whoever shall undertake this task must be a profound philologist; for there are over 1,000,000 peaks in the Rocky mountains, and only 40,000 words in the English language.

CHARACTER OF DR. HAYDEN'S WORK.

The survey of the territories as prosecuted by Dr. Hayden exhibits the scientific progress of our time; for the maps made under his direction show finer topographical distinctions than those obtained by the older methods; indeed, none of our States, if we except California, have creditable maps, executed on a plan of unity and

precision. Dr. Hayden selects a defined area, and exhausts it in geography, and almost every collateral branch of science; and this is the reason that Geikie, the eminent geologist of the University of Edinburgh, writes: "Your Yellowstone work has roused the greatest interest here; and the way in which you have illustrated it by description, engravings, maps, sections and photographs, is quite a triumph of scientific exploration, and almost arouses a feeling of envy in the breasts of governmental geologists like myself, who either have no such splendid materials to work upon, or are in the hands of economical governments who will not allow them to publish fully the results of their labors." There is one hundred and fifty years of labor in the territories for Hayden and the other government expeditions before we shall have a knowledge of what we own; but before that time it is probable that the net-work of railways west of the Mississippi and the growth of the far western political fabric will increase the Union to one hundred States, the new-comers each larger than Massachusetts; and not a few of them will be on those great plateaux flanking the Rocky mountains. It may surprise you, perhaps, to learn that one of these surveys is the finest specimen of organized intellect that can well be imagined. The German gymnasiums, the universities of England, the polytechnic schools of France, the military and naval schools of the United States, the parent college of New England, and that nondescript institution from which graduate men of the world—all of these I found represented in this rude, but mentally and physically, strengthening life in the mountains.

A NEW CABINET OFFICE DESIRABLE.

In looking over the ground now, I can see but one practical suggestion to make, and that is the chief point of my discourse to-night. All of the surveys should be consolidated under one general head, under one general department. We know that the War Department will never willingly relinquish the control of its expeditions; the same truth applies to the Treasury, Interior, Navy, and State Departments, for all are engaged in survey and exploration; and the result is often contradiction, confusion and bitterness. What, then, should be done to secure uniform results; to thoughtfully, judiciously disburse the millions annually appropriated under a general plan; and to develop in the highest degree, with greatest dispatch, our western domain? Surely the interests are of sufficient magnitude to warrant an addition to the Executive Department of the Government, I mean that a new cabinet office should be created, charged with the unifica-

tion and administration of these now divided trusts; and such an officer should, in experience in public affairs, in mental organism, and unselfishness of character, resemble Thomas Jefferson, who, in 1803, purchased the territory, and set on foot the exploration which has given renown to a long list of names, from Lewis and Clark to Dr. Hayden.

A MINIATURE MODEL OF THE UNITED STATES.

Model making is to be introduced by Dr. Hayden to illustrate the topographical features of the far West; Mr. Holmes, his able artist, is to make the Elk mountain range in miniature, colors, snow-masses, water-courses, and all. You are perhaps aware that the French have obtained a considerable degree of perfection in the art of wood-sculpture and clay-modelling. You, who have rambled through the attractive halls of the *Invalides*, will remember the aged and maimed soldiers of the first empire guarding the models of fortresses and cities in miniature, showing the physical approaches, conduit, and outlying territory. Although of little avail when the war-cry was sounded in 1870, in the hands of the cooler Germans, they would have been powerful weapons at Head-quarters for such men as Moltke, Blumenthal, and Frederick Charles. There is no reason why the Central park of this city should not have a complete model of the United States prepared upon a scale of half an inch to the mile, which would reduce the country to the size of about 100 feet by 125. Pertinent to this subject, I have received a letter from Mr. Augustus John Harvey, Fellow of the Royal Geographical Society, advocating a system of geographical gardens for the people, in complete and entire substitution for maps and charts, or in combination with them. This able Englishman, who unites the genius of Ruskin with the philanthropy of Wilberforce, suggests a perfect geographical cosmos, in which shall appear the flora and fauna; river-systems, oceans, islands, etc., traced out upon a plastic protoplasm of concrete. "What would take years to learn," he says, "and understand from books, maps and charts, could be learned and understood in a few hours or visits, by old or young, to such a place." I need not assure you, Mr. President, that the father of many innovations for the public good, he has never yet failed.

NECESSARY MEASURES.

What is needed to develop to the highest degree, and with the most satisfactory results, this the fairest region of America?

First. A gathering of all the Indians within the borders of Indian territory; their consolidation into sympathetic tribes, and the appoint-

ment of an army police to maintain order and to assist, when necessary, in executing the laws; and when the moment shall be deemed expedient, to give them a special system of civil jurisprudence, eventually admitting them to the rights of citizenship and State sovereignty within the Union. This would, in a short time, dispose of the vexatious Indian question, large army appropriations, and annual Indian wars. There are 300,000 Indians of all ages and sexes in the United States.

Secondly. An entirely new and complete system of laws, fundamentally new, and adapted to western life, should be drawn up by a commission authorized by Congress, to consist of three of the purest and ablest public men from each territory. The past should be ignored, and statutes should be framed and adopted of a simple but comprehensive character, that would leave little to be done by a State subsequently admitted to the Union. Wise provisions would be these:

1. That no man should be eligible to the gubernatorial office who shall not have been for five years preceding his appointment an actual resident of the territory.

2. That each territory shall undertake the systematic exploration and survey of its own domain, under the general direction of a bureau of exploration, especially created at Washington.

3. That the territorial government shall be responsible for the preservation of the public domain.

Third. Liberal landed inducements to settlers and capitalists.

Fourth. Irrigation by the government.

Fifth. The encouragement of narrow-gauge railways.

Sixth. Stringent laws to punish those who deceive capitalists by spurious enterprises, thus destroying the prospects of the territory.

Seventh. A government bureau of mining to secure fair dealing.

Eighth. A territorial department to protect the forest from destruction.

And here I would call your attention to four important maxims.

1. Beware of rose-colored pamphlets.

2. Move with deliberation and never rush with the crowds.

3. Divide all dazzling enterprises by four and ask yourself if you can afford to lose the quotient.

4. Narrow-gauge railways are the surest forerunners of a healthy civilization.

DECLINE AND ULTIMATE EXTINCTION OF MORMONISM.

I visited Utah in October, and was received by Gentiles, Brigham Young and the minor Mormons with the utmost courtesy. Without

detaining you with details, I shall give my general impression in a paragraph.

Polygamy is a doomed institution. As long as the saints could maintain isolation, living a three months' journey from California, and four months from the Missouri river, polygamy could be compelled by the fierce threats of the autocrat from the rostrum of the Tabernacle. But when the railroad came, fashion invaded the realm of the latter-day saints. The women began to despise their coarse gowns and peasant lives, and soon Salt Lake City was embellished with fineries scarcely inferior to those sold in New York. Thereafter more than one wife severely taxed the purses of the seers and prophets, who, as a class, are men who love money. Plurality in marriage began to lose its fascinations; a son of Brigham Young rid himself of a duplicate partner, and in domestic matters obeyed the behests of the Christian creed. Household ties loosened, and in the family of the prophet himself bitter dissensions arose as to the distribution of his large wealth. The young girls and men who have grown up since 1850, now unmarried, and of whom there are 30,000, abhor polygamy, and will not embrace it, and the president is powerless to coerce. Their religious belief, constantly riddled by satire and stung by ridicule, is slowly ebbing away. I asked one of their renowned and wealthy bishops how he found time to handle this moneyed enterprise and attend to the duties of the Church. "Oh, damn the Church!" he replied, as if I underestimated his good sense. And when I asked another Mormon about the golden plates which the angel Gabriel kindly brought down to Joe Smith in the year 1830, that he might translate the Book of Mormon from Divine Writ into bad English, my friend waved me off with a merry twinkle in his eye. Mr. President, the success of Mormonism was due to heedless persecution, which always gives strength to every imposition; for repressive measures only serve to strengthen the institutions they are designed to destroy. The death of Brigham Young will undoubtedly speed the disintegration of the Mormon legions.

UTAH.

No territorial or municipal debt.

Telegraph lines	1,100 miles.
Taxes, 1½ mills per	\$100
Population of Utah	150,000
Population of Salt Lake City	26,000
Exports for 1873	\$10,000,000
Ore and bullion	\$5,000,000
Agricultural products	\$5,000,000
Assessment roll	\$22,000,000

Land, cultivated.....	264,500 acres.
Railways.....	242 miles.
Schools.....	204
Sunday-school scholars.....	36,000
Woolen manufactories.....	6
Reduction works.....	34
Cotton mills.....	3

Mountains of silver, lead, copper, iron, salt, sulphur and coal are found here.

SIGNIFICANT FACTS.

On the exploration of this great region of the continent nearly \$20,000,000 have been spent since 1803 — enough to have completed the survey of the public domain, if systematic work had been followed. But as it is, nearly all our information of value has been collected during the past ten years. The Coast Survey alone has spent on the average over \$200,000 annually west of the Mississippi, and generally speaking, in connection with exploration, over 10,000 men have been employed. Significant facts connected with that extended area should not escape your attention, Fellows of the Society. In the first place, two-fifths of the entire area of the United States is so arid that even irrigation cannot redeem it; indeed, west of the Mississippi, one-sixth of the entire territory is alone susceptible to cultivation. And if you ask the reason why, the answer is plain: the great unwatered plains traversed by the Union Pacific railway are essentially Asiatic, with Asiatic deserts, climate, and ethnological relics. It is Asia on this side of the Pacific, while the eastern half of the Union resembles Europe in configuration, climate, and flora and fauna. In Colorado, New Mexico, Arizona, Nevada, Utah, Wyoming, Idaho and Montana, not one-fifteenth of the area can ever be rendered available; and it is doubtful if any of these territories will support more than 300,000 people at a time, from our present knowledge of their resources and agricultural methods; and in the Territory of Wyoming not over 5,000 square miles of the 100,000 square miles of area can be termed arable land. Keep these figures in view, and you will know how to invest your money.

CONCLUSION.

“What is your impression? With what views of the great West did you return to the Atlantic seaboard?” I may answer in a paragraph. It was the pleasantest period of my life, half of which had been devoted to domestic and foreign travel. There the ruins of the past, with disputed history and dreary legend, could not force upon my mind the solemn procession of events which darken and illumine

the ages of the Old World. I saw nothing but the bloom and beauty of the present, and the golden promises of the future. The terrors described by the early explorers had passed away; the dangerous beasts, untouched, displayed no aggressive ferocity; the early miscreants, who killed and plundered, had died, or fallen into honest pursuits; the wild gold fever was subsiding into a regular and organized business; towns and cities were putting on the manner of our social East. The civilizing methods, no longer what they were but twenty years ago, were in active operation, defining the abodes of the future millions. Every thing and every one seemed to be settling from a long and wearying fermentation. Caution was replacing recklessness; stability, the fragmentary institutions of other days; and in the midst of this region of mountain and valley, this region of the grand and picturesque, this land of prosperity for ages yet to come, I felt there was but one great work to be accomplished — the admission of Colorado into the Union; and that has been the redeeming act of the 44th Congress.

XII.

THE WHITE NILE.

By ISMAIL PACHA.

The following letter from the Governor-General of the African Soudan has been received :

KHARTOUM, JUNCTION OF THE BLUE AND WHITE NILES,)
March 18, 1874. }

ALVAN S. SOUTHWORTH, *Secretary of the American Geographical Society*—DEAR SIR:—When I received your last communication, informing me that the honor of being elected a Fellow of the American Geographical Society had been conferred upon me, you desired me to contribute toward the Society such information as might be of interest. I am happy to say that an opportunity presents itself already to fulfill my duty to the Society. I dare say you will be acquainted with the fact that one of the principal obstructions which explorers and merchants bound for Central Africa, who chose to go by way of the White Nile, had to encounter was the “Sudd,” a great mass of vegetation which in the course of ten years obstructed the navigation of the White Nile entirely, so that only in the rainy season small vessels could reach the Gondokoro by way of the Bahr-el-Giraffe, and in the remainder of the year all communication with the Upper Nile was interrupted. It has been my constant aim to have this obstruction cleared away. I had sent a report of the possibility to achieve this to His Highness the Khedive, and His Highness, in his indefatigable activity for the welfare, happiness and civilization of his countries, immediately ordered me to proceed up the White Nile, inspect the places myself, and suggest the best means of executing the work. I left Khartoum accordingly in February, last year, with 300 soldiers, one steamer and five sailing ships, and the river being low then, I immediately commenced to work with my

men. We carried on the works for about two months, from morning till night. We encountered a serious accident; an enormous portion of the Sudd gave way and surprised us in the middle of the night, five ships were lost and the steamer was upset; in fact, so sudden and so terrible was the approach of the fast mass of Sudd and water that we only escaped by a miracle; many of my people were wounded, but fortunately no lives were lost. As a curiosity, I may mention that an enormous hippopotamus was crushed to death against our steamer. It supplied several excellent meals for my soldiers, who seemed to relish it very much.

After working for two months the Nile rose, and I had to abandon the work until the next season. I consequently returned to Khartoum, with the intention of recommencing the work as soon as the Nile was down again. His Highness, however, having appointed me since to the Governor-Generalship of Soudan, I was so much engaged with the organization of my new provinces that, to my great regret, I had to leave it to somebody else to conduct the work. I sent 300 men again up the White Nile, and one of the large steamers we had here in December, last year: and, after three months more hard work, the Sudd was entirely cut through and a passage opened for our large steamer, so that even now, when the Nile is down, it passed the whole distance from the point where the Bahr-el-Gazal commences, to the point where the Bahr-el-Giraffe rejoins the Nile, the distance the Sudd extended to; thus communication from Khartoum to Gondokoro in the main river is opened again after an obstruction of ten years' duration. Any vessel will reach Gondokoro now at any time of the year. It was the best news with which we could possibly welcome the new Governor of the new provinces situated on the White Nile, Col. Gordon, who arrived here last week.

I remain, dear sir, etc, the Governor-General of the Soudan,

ISMAIL PACHA AYOUB.

XIII.

LIVINGSTONE'S NILE—WHAT IS IT?

BY A. J. RUSSELL, C. E.

(Communicated April 27, 1874.)

[This paper is devoted to an investigation of the problem of the Lualaba, with the view of showing, by a critical examination of the facts known at the time the paper was written, that the Lualaba is probably the Congo and not connected with the Nile system.]

Now that the reported death of Livingstone is confirmed, and the great explorer has been cut off before completing the enterprise to which he so heroically devoted himself, we naturally inquire: In what condition has he left the great problem of African hydrography he was engaged in resolving, and what is the aspect it bears? Is the mighty River Lualaba, with its great lakes, that he discovered, really the Nile, or, if not, what is it?

If his latest journal has been preserved, perhaps it may contain his last conclusion on the subject, or throw further light on it. Should his journal be lost it will be difficult fully to appreciate the value of the service rendered to society by Stanley in finding Livingstone and bringing out so much valuable information as to his discoveries, and the portion of his journal contained in the sealed parcel addressed to his family, which possibly might not otherwise have been preserved.

It is true that the information that Stanley communicated was necessarily imperfect, and that the maps given in explanation of it conflict materially in parts with what is contained in Livingstone's letters, when carefully collated. But then it is to be borne in mind that Livingstone himself was still groping his way, and, from well-grounded objections to the erroneous manner in which his former

notes had been worked up, intended reserving for himself the task of setting before the public his discoveries and final conclusions after verifying them to his own satisfaction. Nevertheless, in full appreciation of the generous sympathy of Stanley and his mission, he liberally communicated to him such ample information as to his discoveries as to enable him to give that interesting general summary of them which his work affords.

It is unnecessary to dilate on Livingstone's discoveries in Africa; they far exceed, in extent and importance, those of any other explorer of that continent. Passing over his earlier explorations, farther south, we may glance briefly at those pertaining to our present subject—his supposed Nile.

About four or five hundred miles south from Speke's great heart-shaped lake, the Victoria Nyanza, which hangs downward from the equator, and nearly the same distance from the east coast of Africa, rises the River Chambezi, flowing westward toward the interior, a little north of latitude 12° south. From the area it apparently drains, and the humidity of the climate, it may be as great a stream as the Elbe in Saxony. On traversing its valley downward, instead of finding it to be, as its name seemed to show, the upper course of the great river Zambezi, which falls into the Mozambique channel opposite the island of Madagascar, it led him to the discovery of the great lake Bangueolo into which the Chambezi falls.

Lake Bangueolo lies about midway across the continent along the north side of the line of latitude 12° south, with a length from east to west of at least a hundred and fifty miles, Livingstone says, and a breadth of about seventy, covering an area probably larger than that of lake Ontario.

The river Chambezi is the commencement of the great river which Livingstone believed, on further exploration of its waters, to be the Nile. Leaving the north side of lake Bangueolo with greatly increased volume of water, and under the name of Luapala, he traced it northward through a smaller lake, Moero, and then by alternate great courses of northing and westing, for some six or seven hundred miles, to another large lake called Kamelondo, where it receives on the west the river Lufira, a large branch from the south. From lake Moero downward the main stream is called the Lualaba (indicating it to be a lacustrine river, a term applied also to its two chief tributaries). Here, owing to the extreme humidity of the climate and the exceedingly numerous tributary brooks and larger streams, he found that it had already become an enormous river, varying from two thousand to six thousand yards in width, and flowing with a

strong current where it was apparently two miles wide; that is, fully equal in magnitude to the river St. Lawrence below Montreal.

This great outflow of water is not surprising when we consider that it is from one of the most rainy regions in the world. Its water-shed he describes as a table land four or five thousand feet in elevation, with mountains rising from it to six or seven thousand feet above the level of the sea. The valleys spongy with moisture, with brooks and streams on an average every two miles, reaching in depth to the calf of the leg and the waist; and forests on the uplands, looking as rank in growth, from the moisture, as the mangrove swamps of the coast. Yet this table land of interior Africa, no doubt owing to its great elevation, is described by Sir Samuel Baker as having a healthy climate,—the uplands suited for the growth of coffee, and the lowlands for that of cotton.

Reverting to the Lualaba, Livingstone's exploration of it terminated not far beyond Lake Kamelondo, a little over four degrees ($4^{\circ} 09'$) south of the equator, where the river is, he says, five degrees west from the head of Lake Tanganyika. He afterward reduces this distance as over estimated, and states the river to be between 26° and 27° W. longitude. He turned back at four days' journey above the head of a series of rapids and terrible whirlpools. Fifty miles below this, he says, the Lualaba receives on the west its greatest tributary branch, the Lomami, which, like the Lupira already mentioned, rises at the mound of four fountains, near latitude 12° S., spoken of by Ptolemy, on the authority of ancient Arabian geographers, as yielding two sources of the Nile.

Beyond the entrance of the Lomami, he says, a fourth large lake is formed, which still remains to be explored,—*with many inhabited islands in it* (to which we shall again have occasion to refer). Beyond this lake, he says, it is reported that the river passes into large reedy lakes, forming, he thought, Pertherie's Nile, which joins what is considered the main White Nile, about lat. 10° N., half way down between Gondakora and Khartoum.

In the map published with Stanley's letters, in the *New York Herald*, hastily extemporized no doubt, merely to give a general idea of the waters spoken of, Lake Bangueolo is placed two degrees and a half further north than the latitude given it by Livingstone; and the Lake Victoria Nyanza three-quarters of a degree too far south. In the map published in the London *Illustrated News*, Lake Bangueolo, instead of being made a hundred and fifty miles long, as Livingstone states it to be, is shown as being only seventy-five, and his two great westerly courses of the Lualaba, of a hundred

and eighty and a hundred and twenty miles, are shown imperfectly, as giving only one-third of that westing; and lastly, in the map given in Stanley's very interesting book, the Lualaba instead of joining the White Nile as the Bahr-el-Gazal or Pertheric's branch, as Livingstone indicated and believed, is shown as flowing into the Albert Nyanza of Baker, in deference, probably, to Capt. Grant's criticism, showing that the Bahr-el-Gazal was utterly too small to be the Lualaba of Livingstone. But the Lualaba, which Livingstone makes two thousand feet above the sea level, where he left it, cannot well flow into the Albert Nyanza, which is three thousand feet nearly above the sea (2,700 by Baker), especially as it has to descend the fifty miles of rapids Livingstone speaks of before reaching Gondakora, which Baker makes to be nineteen hundred feet above the sea.

These remarks are not made in a spirit of captious criticism, but to show the difficulty of dealing with the Lualaba on the supposition of its being a branch of the Nile at all, and also the very general and indefinite character of the data scattered through the great mass of interesting information acquired by Mr. Stanley, and contained in Livingstone's own letters. As to that, I speak from experience, for though familiar with hydrographic difficulties from having had to deal for nearly thirty years with those arising from very many conflicting and imperfect surveys of the Ottawa and its tributaries, covering an area equal to that of the New England States, taken together, I found that it took protracted study to deduce from that scattered data in his letters, a consistent rough projection of the simplest kind of the waters of Livingstone's Nile.

The discrepancies mentioned may serve to show the great loss to geographical science by the death of Livingstone, who alone was qualified to work up his own observations, and correctly develop the great conclusions his vast personal knowledge of the subject, and experienced judgment enabled him to deduce from them.

Another error of Stanley's, of a different nature, requires correction, especially as it has passed unnoticed by so many of our own newspapers in quoting the statement; that is, his assertion that taking Livingstone's idea to be correct, his great river Lualaba is the main Nile, the Nile is found to be the longest river in the world next to the Mississippi, and second only to it.

That such an error should pass unnoticed is very extraordinary. Every school boy can see that the Nile enters the Mediterranean at latitude $31\frac{1}{2}^{\circ}$ North, and Livingstone shows us that the south shore of Lake Bangueolo must be in latitude 12° South, and its southern

feeders must naturally extend half a degree farther south, at least ; from which it is obvious that the Nile, from its mouth to the most southerly sources of its waters, would thus extend over forty-four degrees of latitude. He would also see that a direct line from the source to the mouth of the Mississippi is as nearly a north and south line as the same general line of the Nile, and that the two rivers are about equally crooked in their courses ; but that the Mississippi extends over only eighteen degrees of latitude, or much less than half the extent of Livingstone's Nile, which Stanley was speaking of. In short, he would find that if the direct length from source to mouth of Livingstone's Nile, spoken of, were laid down over the Mississippi, it would extend over the Mississippi from its mouth to its source, and beyond it, northward, through the whole length of the continent, and two hundred miles further, into the Arctic ocean ; in short, that the continent of North America was not large enough in that direction to contain the Nile. Measuring the Mississippi to the most north-westerly source of the Missouri, would make little change in the comparison.

The prevalence of error as to the size of American rivers, and of erroneous tables in our school books which give rise to it, is much to be deprecated if real knowledge be our object.

Livingstone believed that the great river Lualaba, which he discovered, was the Nile, and that in its head waters, those of the Chambezi, he had discovered the long sought sources of the Nile. But there are reasons, all but insurmountable, for believing that he was mistaken ; — reasons for thinking that, in discovering this greater river than the Nile, he has found, and bequeathed to science, another mystery as great as that he thought he had solved by that discovery — a mystery like that of the Niger, which occupied public attention so much sixty years ago, another great river for which an outlet to the ocean has to be discovered.

There is also every reason to believe that, though mistaken as to the Lualaba, he, in discovering, on the 2d of April, 1867, that intensely solitary and romantic Lake Liembe, which connects on the east side with the south end of Lake Tanganyika — had, as he then thought, really discovered the true source of the Nile — (if a lake receiving three fine streams apparently as large as the Thames at Richmond, or the Clyde at Glasgow, can be called the *source* of the Nile). Taking it as the source, it still leaves the Nile a course traversing forty degrees of latitude, and that would reach from the Gulf of Mexico to the mouth of Copper Mine river on the shore of the Arctic.

As Lake Liembe is connected by a broad channel with Lake Tanganyika, which by the last reports is discovered to be connected with Baker's Albert Nyanza, forming an uninterrupted lake navigation of about eight hundred miles, Livingstone was apparently right in thinking that in the Liembe and its tributaries, he had discovered the head waters of the Nile; and Baker equally so in thinking he had discovered the great reservoir of the Nile in his Albert Nyanza. These facts will immediately be completely determined by the steel steamers he, Baker, sent up to Ismaal, above Gondakora, to be transported past the rapids to Albert Nyanza.

This connection, now reported to be ascertained between the Lakes Tanganyika and Albert Nyanza, proves that the Arab merchant Hamed's statement is correct, though Speke disbelieved it;* that Tanganyika received a large feeder at the south end (the Liembe with its large river-like outlet), and that there was a still larger river, which he said he saw and felt to be flowing out on his voyage to the north end. Though it escaped Livingstone and Stanley's limited exploration of the north end, this connection, which makes an interesting and important addition to the wonders of the Nile, seems necessarily an absolute certainty; for did it not exist, Tanganyika would necessarily be a salt lake like all others without outlets, as the salts natural to all rivers accumulate by the evaporation of ages in such lakes, but Lake Tanganyika is stated by Speke to be "perfectly sweet."

Lake Liembe is about forty miles long, and eighteen to twenty wide. It lies down in a hollow, with precipitous sides 2,000 feet in height. Livingstone says it is extremely beautiful. Magnificent tropical forests and vegetation clothe the steep slopes of the mountains that surround it, down which broad streams leap in splendid cascades; a natural paradise, where elephants, buffaloes and antelopes feed undisturbed by the natives, whose villages are embowered in palm trees, and who till the land and rear goats on the rocky islands; while hippopotami, crocodiles and fish swarm in the waters.

The solitary and romantic beauty of Liembe seems appropriate to its character as the source of the ancient, great, renowned, mysterious Nile.

When we sum up its characteristics, its unequaled length of course, the magnitude of its lakes, which rival those of the St. Lawrence, the singular importance of its inundations from time immemorial, the number and variety of nations, historical and unhistorical, that

* It was not correct. There is no such large feeder as ascertained by Cameron's exploration and discovery of the outlet at the west.

occupy, or have occupied its valley, and the overwhelming antiquity and grandeur of the monuments of past civilization on its banks, we find it to be the foremost of the famous rivers of the world.

Mighty as Livingstone's Lualaba is as a river, its importance, in public consideration, is chiefly due to the belief that this hitherto "great unknown" river was the Nile. It is evidently necessary now, however, to abandon that idea. We see that it cannot become the Nile, by entering the Albert Nyanza, as represented on the map with Mr. Stanley's book, because to do so would be to ascend nearly a thousand feet. Nor is it the Bahr-el-Gazal, which Baker, on examining, found to be only a mile wide and shallow, with no perceptible current where it joins the Nile, though the latter was flowing at the rate of a mile and a half an hour, vastly the greater stream, and in no greater degree augmented by the Bahr-el-Gazal. As the Lualaba, where Livingstone left it, was a much greater stream than the Nile itself, it is impossible that its waters could join the Nile as the insignificant Bahr-el-Gazal. Some may argue that in the intervening thousand miles of its course to the junction, it may have lost much of its waters by evaporation, or absorption in the low marshy country through which it passed; but by a glance at a rain chart, it will be seen that such evaporation is impossible, as it is the greatest rain region in the world; and as the Nile, though a smaller stream, traverses the same country, where it is an almost boundless marsh, without undergoing any apparent diminution, much less could the Lualaba, a much larger stream, lose its water; and what is equally conclusive, Sir Samuel Baker, after having his attention directed to the question, and with the opportunity his late expedition gave him of satisfying himself about it, informs us, since his return, that there is no large stream enters the Nile on the west side.

This naturally leads to the question: What, then, is this Lualaba of Dr. Livingstone, and where does it go to?

Capt. Grant suggests that it may flow north-westward two thousand miles, and lose itself in Lake Chad; but if the Nile can force its way to the sea through a rainless desert, much more should the Lualaba, a greater stream; or, being twice as great as the Volga, and flowing through an exceedingly more rainy country, it would necessarily have made in the desert a sea greater than the Caspian.

It is altogether unnecessary, however, to have recourse to any of these impossibilities. The Lualaba of Livingstone is absolutely needed to explain the existence of one of the two greatest rivers in the world — the Congo or Zaire, which enters the Atlantic six degrees south of the equator, and has been surveyed up to within about six

or seven hundred miles of the point to which Livingstone ascertained the position of the Lualaba. It is true that Livingstone thought he had traced the Lualaba past all the branches of the Congo; but it was the southerly branches of the Congo, whose head-waters he had traversed, that he thought of, without taking into consideration the great, almost unknown north-east branch, which preponderates so in magnitude as to govern the period of highest flood in the Congo.

About sixty years ago I read, in some work that I have forgotten, a statement, by Mungo Park, of his reasons for believing that the Niger discharged its waters through the Congo, stating the enormous volume of that river, which he compared to the Amazon in outflow. Similar arguments in support of the same view appeared in an article in the London *Quarterly* of April, 1815. All these facts and arguments adduced point with double the show of reason to Livingstone's Lualaba, not only because the Niger is already otherwise disposed of, but because the Lualaba is much the nearer, and necessarily the more probable, especially as without the Congo no outlet is possible for the Lualaba, and because the great volume of water discharged by the Congo cannot be accounted for without including the Lualaba as its main stream. This will be apparent when we consider the enormous outflow of water that the Congo pours into the Atlantic.

The reviewer states that it is agreed by all writers who mention this river that it has the remarkable peculiarity of being in almost a perpetual state of flood, varying only about nine feet, while the Nile and the Ganges, inconsiderable streams compared with it, vary above thirty feet, and that its depth probably exceeds that of all other rivers. It has, however, two floods, one, the greatest, beginning in March, and the lesser in September. Its double floods and very moderate variation in height of water the reviewer ascribes to the erroneous hypothesis of its receiving the Niger as a tributary, whereby it would receive, at opposite seasons of the year, the floods of the rainy seasons of the opposite sides of the equator. So it does undoubtedly without the Niger, in a considerable degree; but if it be the Lualaba, as we have reason to believe, its comparative uniformity of condition would be a necessary consequence of the large lakes of the Lualaba already mentioned, just as the great uniformity of the St. Lawrence, compared with other rivers, is the necessary consequence of its great lakes, acting as regulating reservoirs of the waters they receive and discharge.

The review, in a foot-note, gives the discharge of the Zayr (the Congo) into the sea, when at its lowest state, as four millions of cubic feet of water in a second of time, which seems scarcely possible,

as that is fully ten times as much as passes over Niagara, as computed by the New York State Engineers, or four times as much as can be allowed for the discharge of the St. Lawrence into the gulf, at Antecosti; still, if the Congo be the Lualaba, which is the only way of accounting for its enormous volume, the area that it drains must be about double that drained by the St. Lawrence; and a glance at a rain chart shows it to be an incomparably more humid and rainy country. Calculations of the discharge of rivers are especially unreliable, however, in estuaries, more or less influenced by tides, and where the current at such enormous depths is unknown, and possibly the surface water only may be fresh. Far from having a bar at its mouth, like feeble streams, Captain Ireby, of the frigate *Amelia*, found the waters of the Congo flowing perfectly fresh, with a current of four and one-quarter miles an hour out at sea, twelve miles beyond the mouth of the river, and ninety feet in depth. In the entrance, where it is fifteen miles wide and over six hundred feet in depth, he found a constant current of six and one-half to seven miles an hour, of fresh water. This must have been at the time of flood, for Captain Tuckey, in 1870, found the current seldom as much as four and one-half miles an hour, at lowest water, but with the enormous depth of six hundred and eighty feet, without touching bottom. At the head of navigation, a hundred and forty miles from its mouth, the tide is slightly felt when the river is at its lowest, the depth, for the last fifty miles, varying from a hundred and eighty to three hundred feet. Then above this the channel is a narrow gorge, with precipitous banks, and obstructed by rapids and falls for forty miles, with mountains on each side rising to the height of two thousand feet. I quote the results of Tuckey's explorations, because I find, on referring to more modern works, that little or nothing has been added to our knowledge of the Congo, except the position of the head-waters of its south-westerly branches discovered by Livingstone. Tuckey, and nearly all of his party, perished by sickness, and it is reported that the expedition sent up the Congo recently, to penetrate to Livingstone, has proved a failure. Tuckey's exploration extended to a hundred miles above the rapids, where the river "presented a most majestic appearance," with a width of two, three and even more than four miles, and a current "from two to three miles an hour." Here, far above the influence of the tide, flowing unobstructed, where its magnitude can be fairly estimated, we have it, at lowest water, a stream apparently about twice as large as the St. Lawrence,* below Montreal, in flow of water; and the native traders

*Above Lake St. Peter, where it has still nearly half its tributary waters to

informed Captain Tuckey that it was the same size six hundred miles further up.

That distance, following the main north-easterly branch, would reach comparatively close to where Livingstone left his great Lualaba, closely resembling it in character and magnitude; in nearly the same latitude south of the equator as Captain Tuckey's exploration of the Congo ended. As it would be absurd to suppose that the Lualaba could be evaporated in the country that give out so enormous a stream as the Congo, and as no naturally admissible outlet can be found for the Lualaba but the Congo, and as the size of the Congo cannot well be accounted for without identifying it with the Lualaba, it seems difficult to avoid believing them to be the same river. Such a conclusion is strongly supported by the accounts given by early Portuguese missionaries and historians, of the time when that nation was justly renowned for its African discoveries.

The reviewer in the *Quarterly* for April, 1815, quotes Barros, who states that the King of Congo (then a kingdom of great extent) received an account of the rebellion of a people who inhabited certain islands in a great lake out of which flows the Zayr (Congo), which runs through the kingdom of Congo. This great lake would seem to correspond, in position as well as character, with the great lake Livingstone speaks of with "many inhabited islands," already mentioned, as being beyond the junction of the Lomami, which is fifty miles down the Lualaba from the point where he turned back.

Capt. Tuckey says that combining his own observations with all that he could collect from the natives he could not help thinking that the Congo would be found to issue from some large lake or chain of lakes considerably to the northward of the line. But here as to the position of the lakes he seems to have been misled by the supposition that the Congo was the Niger. The information given by the old Portuguese and Spanish missionaries alike on the east and west coast of Africa is unquestionably more correct, at least as to the Nile, as now ascertained by recent discoveries. These missionaries speak of the waters of the Nile and the Congo being derived from the same sources; that these sources are large lakes in the *neighborhood of the equator and to the southward of it*, among

receive, the St. Lawrence narrows to a mile and one-seventh in width, with a depth of forty-three feet mid-stream, at lowest water, and a current of two miles an hour; above that it averages a mile and three-quarters in width. The Mississippi, at New Orleans, is, according to Darby, eighty yards less than half a mile in width, and has a depth of one hundred feet, and a current of three miles an hour at ordinary height of water

which Zembre was considered as the "great mother and chiefe ladie of the waters of Africa." Lopes left Rome to visit Congo a second time for the purpose of obtaining full information about the Nile, and by him we are told that the Zayr (Congo) derives its floods from three lakes, the first the Zembre, the second the Zayr, and the third "a great lake out of which the Nile is supposed to proceed." The missionary Marolla speaks of a vast collection of waters from whence one great stream flows through Egypt and the other through the countries watered by the Zayr.

The accuracy of the information as to the sources of the Nile contained in these quotations, as now actually ascertained, gives greatly increased weight to what they contain respecting the Zayr, and recalls the extraordinary knowledge of the true source of the Nile, contained in the immeasurably more ancient Hindu-Puranas, which Sanscrit scholars, as quoted in Baldwin's excellent work on "Pre-Historic Nations," inform us as describing the Nile as taking its rise in the "Lake of the Pods." The country round the lake being called Chandre-st'han or Moonland. Our recent explorers inform us that the country around the lakes at the sources of the Nile is now called "Unyamuezi," or Moonland, which Speke says must have been one of the largest kingdoms in Africa. This ancient Sanscrit description now doubly appropriate, since our most recent discoveries, make Tanganyika and Albert Nyanza one great lake, the identical "Lake of the Pods."

Its vast extent, — its mountains six thousand feet in height, clothed with magnificent tropical vegetation, rank with the humidity of the climate, — and the lofty water falls of the large streams with which their precipitous faces are furrowed, all combine to render the name highly expressive of the emotions of sublimity with which it inspired the mysteriously ancient Cushite fathers of civilization who so designated it; and to whose wonderfully extensive commerce the old Sanscrit writers were indebted for the information.

The reviewer in the *Quarterly* objects to what he calls the notion of the early Portuguese missionaries, that the Congo and the Nile flowed from the same lake or collection of waters (which he thinks they derived from Ptolemy and the ancient Arabian geographers), as being an error of careless observers, if derived even from eye witnesses, and all but impossible in the face of the accepted opinion that two rivers could not flow out of the same lake. We have ample demonstration, however, that they do so in some instances. I, as well as others before me, followed two different rivers flowing in strong rapids, out of the same lake in the Saguenay country, in

Lower Canada. The Ottawa country presents some striking instances of that fact. The whole of the country on the north side of the Ottawa from the mouth of the river Gatineau, opposite the metropolis of Canada, up to the head of Lake Temiscameng, is actually an island two hundred and thirty-two miles long, and a hundred and twenty miles wide; because a lake called Lac des Rapids, at its north end (which is a hundred and forty-five miles a little to the west of north from the city of Ottawa), discharges one river westwardly into the east branch of the Ottawa, and near the same point, sends off another in the opposite direction, which, after a tortuous southeasterly course of ninety miles, enters the Gatineau a hundred and forty miles above its mouth. From this island a lesser one, ninety-miles long and fifty-six wide, is formed by Lake Dumoine sending off two strong rivers, one from each end that enter the Ottawa, one in Lake Temiscameng, and the other more than a hundred miles lower. These facts are not given from imperfect information—they are established by returns of surveys of record in my office.

Thus, though there is much reason to believe that the Lualaba of Livingstone is the Congo, yet, as we see, absolutely, that some lakes do send out rivers in different directions, and that the Lualaba descends apparently to the same flat marshy level from which the Bahr-el-Gazal is known to flow, and as it would be presumptuous to suppose that Livingstone had not some good reason for believing that the Lualaba was connected with the Bahr-el-Gazal, it is quite probable that the early Portuguese missionaries were as correctly informed as to Nile and the Congo flowing from the same lake or waters, as they proved to be as to the Nile flowing from large lakes *on, or south of the equator.*

If there be such a connection, however slight, it is evident that with the least difference in level in favor of the Nile, a very large portion of the water of the Lualaba at high flood, would, owing to the low banks of the Bahr-el-Gazal, necessarily flow into the Nile; and by increasing its floods, and diminishing those of the Congo help to explain why the periodic floods of the Nile rise twenty-five feet at Cairo, and thirty-six feet at Thebes, while those of the Congo rise only from seven to eleven feet, though the Congo is by far the greater river of the two.

If the valley of the Lualaba and its tributaries belonged exclusively to the Nile, and not to the Congo, then the Nile would drain nearly twice as large a portion of the rainy region of the equator, as would, in that case, remain for the Congo, and would necessarily far exceed the Congo in volume; but, as it is known to be very much

smaller than the Congo, it is the latter apparently that must receive the main body of the Lualaba's waters, and not the Nile.

If it be true that Livingstone's attendants have preserved his books, as well as his body, we may expect to obtain, before very long, much more complete information as to his discoveries, than we now possess; but, at best, nothing quite equal in value to his own ultimate conclusions, had he lived to compile the results of his life's labors himself.

A life that for long intervals exiled him almost as thoroughly from all that we know as the society of civilized men, as if he had been removed to another planet; — a life eminently devoted to geographical science, but, judging of it by the heroic resolution of his own mind, preëminently devoted to the welfare of the finest portion of the African race, which he has been so successful in bringing under the notice of Christian nations for protection from the terribly destructive inroads of the slave traders who were advancing into their country.

In speaking of the remotest tribes he visited before returning Livingstone tells us that they are industrious cultivators of the soil, and everywhere very honest. Some of them smelt iron and copper and are good smiths. The men are fine, tall, strapping fellows, with nothing of the Negro in their limbs and features; that the women are light colored, have straight noses and finely formed heads, small hands and feet and perfect forms. He says that when the men are at war the women travel all over the country unmolested, a fact much to the credit of their national character. Some of the tribes cultivate and drink coffee, and all but the Manyema cultivate and weave cotton; and he says that the population is prodigiously large, and food of all kinds is abundant and extremely cheap.

When we consider the high type and the capacity and valuable qualities of this interesting race inhabiting, as far as we know, a fertile and magnificently watered country as large as the valley of the Mississippi, we cannot but regard the combined and so far successful action of the English, American and German governments toward suppressing the slave trade of eastern Africa, as highly important in the history of humanity, and creditable to the Christian character and high civilization of these great nations. No doubt this concerted action was chiefly due to the reiterated representations of our heroic explorer and Christian missionary, Dr. Livingstone, whom, Sir Bartle Frere, with language indicative of his own high character, designates as "the greatest and the best of men he ever had the good fortune to meet."

On the same occasion a similar high-minded appreciation of Livingstone led Sir Samuel Baker to describe his own services to science and humanity in Africa as insignificant compared with Livingstone's — an undervaluation of his own great services in which the public will be unable to concur.

Equally creditable also to Stanley is the large-hearted enthusiasm with which he makes the great and good qualities of Livingstone the most prominent subject of his book. In strong contrast to which stands the ignoble and preposterous suspicion of his veracity entertained by some in the face of letters, unquestionably written by Livingstone, to those who could not be mistaken as to their being genuine. The testimony of Dr. Livingstone's son and Earl Granville's letter on the subject are conclusive as to that, and the letter communicating the thanks of Her Majesty Queen Victoria and the handsome memorial she presented to Mr. Stanley are appropriate tokens of the appreciation his gallant achievement merited.

Stanley was already an experienced traveler, but in his search for Livingstone he has shown himself to be a man of extraordinary determination and executive ability. In his frank and ably written work, "*How I found Livingstone*," besides presenting a vivid and highly interesting view of the physical aspect and social condition of the interesting region he traversed in his thirteen months of travel, he has brought prominently before the vast multitude of ordinary readers a magnanimous and faithful portrait of the noble character of that heroic traveler he was so successful in finding, together with an instructive summary of his recent great discoveries, such as the public generally would have otherwise been long of obtaining, especially now that Livingstone has not survived to publish his own discoveries.

Speaking of the value of Stanley's mission and services points equally to his patron, Mr. Bennett, to whose magnanimity and unstinted liberality the enterprise was due.

The public will look with much interest for the publication of Livingstone's latest journals when they are received, as well as those contained in the large sealed parcel brought home by Stanley. And should Lieut. Cameron succeed in tracing the Lualaba from the remotest point on it reached by Dr. Livingstone to its outlet, as he proposes in his letter of the 17th of October, 1873, from Unyan-yembe, he will have the merit of solving one of the most interesting problems of physical geography.

Though I have to apologize for much that may be stale and prolix in this article I trust that it may be found in some degree interesting to those who are not already better acquainted with the subject.

XIV.

FORMOSA.

BY PROF. J. B. STEERE.

(Communicated.)

The aborigines of Formosa naturally fall under two divisions: First, the ancient inhabitants of the great plains to the west, who possessed some of the elements of civilization, and who, from their exposed situation, soon fell under the dominion of the Chinese, when they entered the island, over two hundred years ago. They are now found scattered nearly the whole length of the island, and generally driven back from the rich lands that were their ancient inheritance, to the sterile and hilly lands near the foot of the mountains, where they are subject to continual attacks from the savages. They have frequently migrated to rid themselves of unpleasant neighbors, both Chinese and savages, and there are known to be large colonies of them who have penetrated the mountains, and have settled in unknown valleys on the east coast. They are generally known by the name of Pepo-whan, which, literally translated from the Chinese, means barbarians of the plain, and demonstrates the fact that the Chinese found them inhabiting the plains on their arrival. A large division of the Pepo-whan, near the center of the island, who still speak their native language, are called Lek-whan — ripe or cultivated barbarians. At the time of the Dutch occupation there were several tribes or nations of this people, each speaking its own language.

The second great division of the aborigines of Formosa is of those who are still wild and savage, and who inhabit the steep and rocky mountains running through the east part of the island. They occupy about half of the island, but their territory, where it has been visited, is steep and rocky. They are probably but little changed by

their intercourse with the Chinese, and there may be tribes who have not yet heard of the Chinese. The gradual advance of the Chinese in their search after timber and cultivable lands has no doubt caused wars among the different tribes, by crowding the more exposed tribes back upon those behind. They are divided up into many small tribes and nations, but their languages, as well as the general customs of tattooing and of cutting off and preserving the heads of their enemies, point to their descent from a common stock. They live much by hunting, but cultivate their steep hill-sides in millet, sweet potatoes, tobacco, etc. They are known by the general name of Che-whan — raw or unripe barbarians. Of those visited, I have called those living east of the Lek-whan settlement of Polisia, by the common name Che-whan, while the others are designated by their tribal names of Tsui-whan and Kale-whan.

The Pepo-whans of the south part of the island occupy a large tract of country to the east of Takow and Taiwanfu. They inhabit the villages of Kongana, Kamana, Alukang, Backsa, Lakuli, Baukimseng, etc., and they may number five thousand people, while there is a large colony formed from them on the east coast of the island. They no longer speak their aboriginal language, using Chinese instead, and the Fuh-kien dialect of this, though they are in contact with the Hak-kas on the south and south-east. I procured the two lists of words, Nos. 4 and 5, from very old women, No. 4 at Kongana and No. 5 at Baukimseng. They both said that their language was very little spoken, even in the time of their parents, Chinese having already become general. The two lists are not identical, and seem to show that there has been a coalescing of tribes, the supposition being strengthened by differences in dress, etc., still apparent among them. I found in existence among them a number of old manuscripts in Roman letter, most of them apparently business papers, such as deeds and contracts. The Pepo-whans still preserve these among their valuables, though no one can read them. Some of them have Chinese pawnshop marks upon them. They seem to be indubitable proofs and remains of the Dutch occupation, when many teachers and missionaries were employed among the aborigines, and many thousands of them are said to have become Christians. When the Dutch were driven out, and the teachers and missionaries murdered by the Chinese, the whole work was supposed to have gone out in darkness, but these manuscripts seem to show that for nearly a hundred and fifty years afterward, these poor people, oppressed and driven back to the hills by the Chinese, still kept enough of the knowledge taught them to read and write their

own language, and almost necessarily books and a knowledge of the Christian religion also. The manuscripts are in the ancient Pepo-whan language, spelled out in Roman letters, the dates generally being in Chinese, spelled out in the same way. Of the manuscripts procured, a few of them are of the reign of Young Ching, who reigned from 1723 to 1736; the most of them are of the reign of Keen Lung, who reigned from 1736 to 1796; and there is one of the reign of Kaking, who began to reign in 1796. Curiously, the oldest of the documents are dated eighty years after the Dutch were driven out. There may yet be found books and manuscripts giving some account of the struggles of this people with the Chinese.

The Pepo-whans are a large and well-formed race, showing little of Chinese features, except where it can easily be traced to inter-marriage between the races, which seldom occurs. The men have no distinctive dress, unless the turban may be considered such, though the Chinese also use this to some extent. The women have a peculiar and very becoming dress, consisting of wide trowsers and a short and wide-sleeved jacket, meeting the trowsers at the waist and fastened with a sash. The head is wrapped in a blue turban, the ends of which are drawn out at the sides of the head like wings and giving them a peculiarly jaunty and coquettish appearance. The Pepo-whans are very poor, having mortgaged the poor lands they now occupy to the Chinese, so that they live principally upon sweet potatoes, the one rice crop that the land produces going to pay rent or the interest on their debts. They burn charcoal and the women carry it in baskets upon their heads to the Chinese villages for sale. They were visited about three years ago by Dr. Maxwell, a Scotch missionary, and they received Christianity readily, the Chinese worship of idols and ancestors having but little root among them, while the traditions they still possess of their ancient teachers probably influenced them to some extent. There are now several hundred christians among them at Kānana, Backsa, etc., with a number of schools and chapels established. The Pepo-whans of Baukimseng, differ from their brethren farther north in their ancient language, and the women, instead of a turban, wear a broad conical hat, like the Hak-kas near them, and this is highly ornamented with tinsel and bits of glass. They are crowded back upon the poor stony lands near the mountains, and they go to their fields armed with lances and fire-locks to protect themselves from attack. The Pepo-whans have nearly lost their love for hunting and fishing, and support themselves almost entirely from the produce of their fields. There seems to be but little hope of their regaining a foot-hold on the

western side of the island, and they will probably be compelled to migrate, like their brethren who have gone before them, to the east coast.

The Lek-whan, a large division of the Pepo-whan, living near the center of the island, seem to have originally come from near Changwha. A few miles to the north of this city there are still toward two thousand living in the towns of Loisia and Toasia, though, like the Pepo-whan near Taiwanfu, badly in debt to the Chinese. There is a large settlement of them in a mountain valley, two days' journey to the east of Changwha, called Posia or Polisia, to which, according to their own account, they began migrating forty or fifty years ago, and they are still going, there now being some four or five thousand there. This valley is entirely surrounded by mountains and forests inhabited by savages. They are nominally at peace with these, and pay them a yearly tribute of rice and cattle, but in spite of this they are continually losing their lives from attacks by the savages, some twelve or fourteen persons from the valley being killed annually, while at work in their fields or fishing or hunting. The only news of the manner or cause of the loss the friends and relatives receive, being often the headless trunk lying where it fell. The Lek-whan call themselves Paijek in their own tongue, which all speak in their families, though all, but the very old, speak Chinese also, and some of the younger ones can write it with some readiness. There seem to be no manuscripts or other proofs that they formerly had any connection with the Dutch, and their position at nearly equal distances from Taiwanfu and Tamsni, the two points occupied by the Dutch, would have made them among the last visited by them, and the least influenced. Their language shows them to be closely connected with the savage tribes of the island, and with the Pepo-whans of the south. They are large and strongly framed as compared with the Chinese, but their faces are coarse, and the teeth of the women protrude; but their countenances show much good nature and *kindly* feeling. Their dress is much that of the poorer classes of Chinese, though for weddings and great ceremonies they use a national dress, consisting of two or three long sleeveless mantles, open in front, and the under one reaching to the heels, while those above are shorter. These are ornamented with a large amount of red embroidery about the bottom. They raise a species of nettle, from which they make a coarse but lasting cloth. They irrigate and cultivate the soil in the same way as the Chinese do, using buffaloes for plowing and for drawing rude carts, that are used in all parts of the island, and are said to be of Dutch origin. They live like the

Chinese, gathered together in villages of huts made of adobes and covered with grass roofs. They are great lovers of hunting and fishing, and are very skillful in making snares for deer and other kinds of game. They generally hunt and fish in large bands, for the sake of protection from the savages, from whom they are always liable to attack. They frequently surround a space of country and drive the deer and other game through a ravine or some other place, when they are easily shot. They use fire-locks quite generally for defense and for hunting, though some of the poorer ones still carry bows and arrows, and many go to their fields or from one village to another armed with lances. They have a curious but very effectual way of fishing the shallow streams that flow through their country, this by damming them and turning the water to one side of the channel, leaving most of the bed of the stream dry, and the fish and shrimps in little pools and under rocks, where they are easily captured. The Lek-whan first learned something of Christianity a little over two years ago, when one of the tribe, an old hunter, strayed down to Taiwanfu, and into the missionary hospital there, where he was cured of an ulcer, and took back with him some idea of the Christian religion. This rapidly spread among the Lek-whans, and there are now four or five hundred church members among them, with many more who have thrown away their Chinese idols and their own idolatry, and have become regular attendants upon the Christian services. There are five or six chapels established among them, and the same number of schools, where the Romanized colloquial is taught them, and I saw many girls and boys who had learned to read and write it. This Romanized colloquial is Chinese of the Fuh Kien dialect, spelled out in Roman letters, with certain marks to show the Chinese accents. There is a lack of school-books, there being nothing but the new testament and a hymn book yet translated into this dialect, but if other books are furnished, there is no reason why these bright, intelligent children may not get good educations, that will be worth much more to them than the Chinese literary education, made up principally of the knowledge of so many thousand characters, and so many old adages of Confucius and Mencius. The ancient worship of the Lek-whan, like that of the Pepo-whan of the South, seems to have consisted of certain idolations, dances and songs, and the worshipping of a boar's or deer's skull. They differ materially from the Chinese in a natural love and taste for music. They have fitted several of their wild idolation tunes to Christian hymns, which they sing with great spirit. They learn European music readily, but seem to prefer their own. They are



Method of tattooing the face practiced by the women of the tribe of Chewhan living east of Posia, Formosa.

naturally honest and hospitable, and we had great trouble in getting them to take pay for the articles of food we bought of them. There are still some remains of their ancient tribal government among them, but the lineal chiefs or head men seem to have purchased small mandarinships, and thus unite the Chinese authority with that inherited. Justice is generally administered as among the Chinese by the elders and head men of the village. They have a curious custom of naming their children after the different kinds of trees in the forests.

The savages that I visited east of the Lek-whan settlement of Posia, I have left with the general designation of Che-whan. The Chinese and Pepo-whans often call them Bon-whan. They occupy a part of the water-shed of the island about the head-waters of the river that flows through the valley of Posia and into the Formosan channel near Changwha, and of other streams that flow into the Pacific. They are said to belong to a nation or confederacy, of over thirty villages, under one chief. They are very small and inferior looking, hardly averaging five feet in height, but very muscular from their life spent in climbing up and down their steep mountains. Their dress is made of a species of nettle, perhaps the ramil plant, which they cultivate, and which the women weave into narrow strips of very strong and durable, but somewhat coarse cloth, which is generally ornamented with red and blue stripes woven in. The only clothing of the men is a coarse sleeveless shirt of this cloth, which comes down to the middle of the thigh. I saw a couple of men among them wearing nothing but narrow (*tapa rabos*), not so wide as the hand, made apparently from the hair of some animal, woven, and colored red. They were said to belong to another, but friendly tribe. The women wear a sort of short tunic or kilt. Both sexes go barefooted, and from long usage, their feet get as hard as horn, so that spines and sharp rocks do not penetrate them. They appeared to be very flat-footed, the arch of the foot being almost entirely wanting, while the toes were much spread, the big toe turning round toward the heel, so that it almost made a right angle. The women are very fond of wearing ear-rings of white shell, and bands of beads of the same about the head. The men stretch their ears, generally by putting in pieces of bamboo, but upon occasions of display, those who are able, put in disks of white shell two inches or more in diameter. Both sexes wear the hair long, the men doing it up in a knot behind, while the women take more pains in braiding and decorating it. They have a practice of knocking out the eye teeth of the boys when they are about reaching man's estate. Both

men and women tattoo, the men generally being content with a perpendicular bar upon the forehead and another upon the chin, while the women tattoo several horizontal bars upon the forehead, and a complex system of lines upon the lower part of the face, that gives it a decidedly blue look. They also tattoo several horizontal bars upon the forepart of the leg below the knee. The tattooing is done near the age of puberty, and the first part tattooed is the bands upon the forehead, the complicated work upon the lower face being left until later. The arms of these savages consist of a few fire-locks procured of the Chinese, and used principally in hunting, and lances and large knives used in hunting Chinese heads. They decorate these weapons with tresses of Chinese hair, and when upon the hunt for Chinese, carry highly ornamented red bags for carrying home the captured heads. They make regular expeditions every year down to the border land, where they lie in wait for the Chinese who come into the forest after rattan, bamboo shoots, etc. Human heads have a recognized value among them, and a man's importance depends upon the number of heads he has taken. The base of the skull is cut off, and the brain extracted, and the head then thoroughly dried, the teeth being generally knocked out — to make necklaces. We saw twenty-four of these skulls upon one small platform, and apparently the property of one man. I could find no proof that they are cannibals, though this charge is frequently laid to them. They may drink the blood of their enemies, as I saw the Lek-whan drinking warm deer's blood, but the bodies of the Chinese killed by them are generally left lying where they fell. They are good hunters, and I saw several bear's skulls among them, and many of deer and wild boar. They generally hunt in bands, and surround their game. Their houses are made by digging a little below the surface of the ground, and then building up heavy stone walls to a height of two or three feet, in which are planted upright posts, and limbs and trunks of trees are interwoven among these to the proper height, and then all is covered with grass. There are no windows, the low door serving for the entrance of light, and an outlet for smoke. One house generally serves for two families, a fire being built at each end, and a couple of low banks of bamboo that serve for seats and beds. They construct various little rat-proof granaries for storing their millet and rice. These are square, and are made of the bark of trees, and covered with grass, and raised upon four posts three or four feet above the ground. These posts are crowned with round wooden caps to keep the rats and other vermin from ascending. These little granaries are perched all about among the houses. There were in



Method of tattooing the face practiced by the men of the tribe of Chewhan living east of Posia.

the village several little huts of wattled grass, and not more than four feet square, perched upon bamboo poles twenty-five or thirty feet above ground. I inquired the use of these, but could get no other answer than that the children were sometimes put to sleep in them, perhaps connected with some superstitious custom or rite. Their household utensils consist of a Chinese iron pot, and a few gourds and water-tight baskets of rattan for holding water. The light they furnished us was a pine torch. I saw no native pottery among these or other savages of the island. They seem to possess no cultivable valleys, so that they are compelled to cultivate hill sides so steep that we were compelled to use both hands and feet in climbing them. They cut down the timber and let it lie until dry, and then set fire to it, burning off the leaves and small limbs, leaving the trunks and stumps upon the ground. They then build low irregular terraces of the small pieces of slate with which the hills are covered, to keep the soil and crops from washing away. They plant sweet potatoes, and a kind of rice that needs no irrigation, but their principal food is millet. After a couple of years or more of use, they allow the lands to grow up again, the second growth generally being a species of alder. After a few years of rest, the land is again ready to be cleared and planted. Their implements are their knives and sharpened sticks, the very steepness of the land cultivated, rendering it more easily cultivated with such poor tools. A mis-step would often send a hundred pounds of stones and earth sliding down. They do not appear to have any settled religious system, but to be terribly troubled with superstitions and fears of supernatural beings and causes. They are said to bury their dead with terrible fear, hastily covering the body with earth, and then all running away, and no more visiting the spot.

While hunting birds with some boys of the tribe, I strayed into a thick dark grove of bamboos near the village, and when I came out, the people motioned me away with their hands, and would not allow me to come near until the old Lek-whan guide who accompanied us, had baptized me upon the face, and hands, and breast, with water. I afterward understood that I had entered one of their burial places. When we got ready to return, they begged us not to drink of the springs on our way down the mountain, for fear that we should enchant them. They make curious little musical instruments by cutting a tongue in a piece of bamboo, which is put between the teeth, and the tongue made to vibrate by pulling a string tied to the end of the bamboo. The tone is modulated by the breath, as in a jews-harp, which it much resembles in sound.

The Tsui-whan — Chinese Tsui, water, and whan, savage — are so called from living about a small lake, which is situated about ten or fifteen miles to the south of Posia, from which they get a great part of their living by fishing. This lake, with the flat, cultivable lands about it, is entirely shut in by wooded mountains, those to the east rising to great height. The lake is over two miles in length, and contains a number of species of fish and eels. There are three villages of Tsui-whan about the lake, containing perhaps in all a thousand people, under one chief, and apparently entirely separate and independent of any other tribes of savages. They are a small but well-formed race, with regular and rather pleasing features. The dress of the men is a hunting shirt made of deer or monkey skins, that does not protect the arms nor legs. The women wear a sort of tunic of Chinese cloth, and protect the fore-part of the leg with a sort of close-fitting gaiter from the thorns and spines with which the forest is filled. They do not tattoo, but have a custom of knocking out the eye-teeth of the boys, so that they reminded me of squirrels. They are not warlike, but use rude bows and arrows for hunting and protection when they are too poor to get firelocks. They are great hunters, and large strings of monkeys' and bears' skulls hung about their dwellings. I saw them fishing with small dip-nets among the pond-lily roots and leaves, and catching a species of cat-fish (*Silurus*). They also fish with rude spears. They use, in navigating the lake, huge hollowed trunks of camphor trees, that look as if they may have been in use a hundred years. They are very awkward and heavy, and appear to have been hollowed with fire. They are open at both ends, the water being kept out with earth and sods. Their houses are large, grass-covered barracks, made of bamboos and wattles, daubed with mud. The roof is supported by a large central post, and to this are hung the firelocks, bows and arrows, etc., that belong to the four or five families that occupy the house in common. The locality of each family is shown by the fire burning on the ground, and by the low bank of bamboo that serves for a seat and bed. The lands about the lake are rich and easily irrigated, and well fitted for rice; but the Tsui-whan have allowed the Chinese to enter, and these, taking advantage of the savage love for strong drink and feasting, are fast gaining possession of all the lands, and the poor Tsui-whan are becoming serfs of the crafty Chinese. The Tsui-whan raise their own tobacco, and all smoke, even little girls of six and eight years of age. They are great lovers of music, and those who were at work, harvesting and carrying home rice for their Chinese masters, were continually droning a musical but monotonous refrain. I was

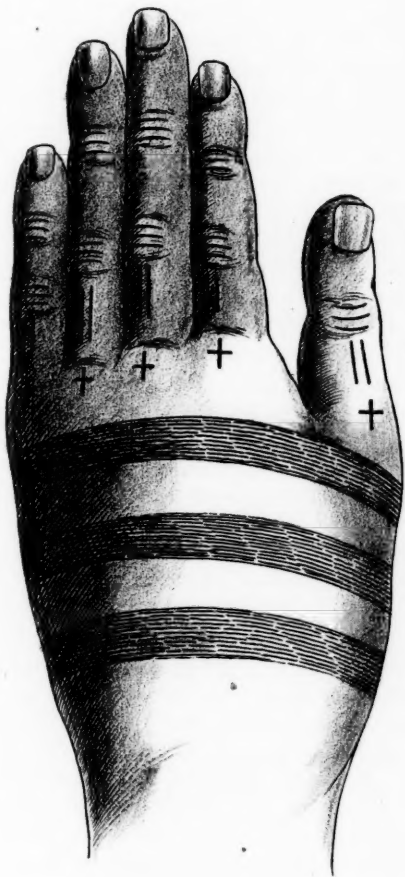
several times awakened, while stopping in their village, by their wild mountain songs, which they sang while at their feasts. They carry burdens upon a high wooden frame that is strapped to the back, instead of by the universal Chinese method of a pole across the shoulder. I could find but little traces of religion, but plenty of superstitions. I was one day astonished by the band with which I was traveling suddenly all dropping to the ground and beginning to groan as if they expected to die. Inquiring the cause of this, I found that a certain bird, to which ominous powers are attributed, had cried out on the left side of the path we were traveling, and this was considered a bad omen for us. After a few minutes the party got up and moved on, though all were still groaning and beating their gunstocks with their knives; and they did not regain their composure until the same bird was heard to call out on the right side of the path, when they moved on as usual. They seem to have little or no connection with the other savages, but to live in mortal fear of them. If they ever were in the habit of taking the heads of their enemies, it must have been long ago, as the proofs have disappeared.

The Kale-whan are a tribe of Che-whan inhabiting the mountains east of Takou. The territory they occupy is not extensive, not reaching over the dividing line of mountains, but all lying toward the west. They live in two villages, which are called by the Chinese Toasia and Taosia—large and small towns. The first and lowest contains perhaps two hundred inhabitants, while Taosia is properly a collection of villages, with toward a thousand inhabitants. They can look down from these villages, which must be at a height of four or five thousand feet, upon the great plain below, thickly dotted with Chinese villages and covered with rice fields, and they can even see the sea in the distance. The Kale-whan are very small in stature, averaging about five feet. The features of the younger ones are quite regular and pleasant, but among the old, want and vice have almost made them to look like brutes. They dress in Chinese cloth—the men in the short coat or hunting shirt, that leaves the legs and arms exposed. The chief was dressed in the skin of a tiger cat, which seemed to be his badge of office. The women dress much as the Chinese and Pepo-whans in the plain below, but they sometimes spend much time in embroidering their sleeves and trowsers. The women were always, while we were among them, whether at work in the fields or in the villages, crowned with wreaths of vines and flowers. These were often nothing more than sweet potato vines, but in some cases beautiful wild plants and flowers. Many of the men were also decorated in this way, and it would almost seem to be

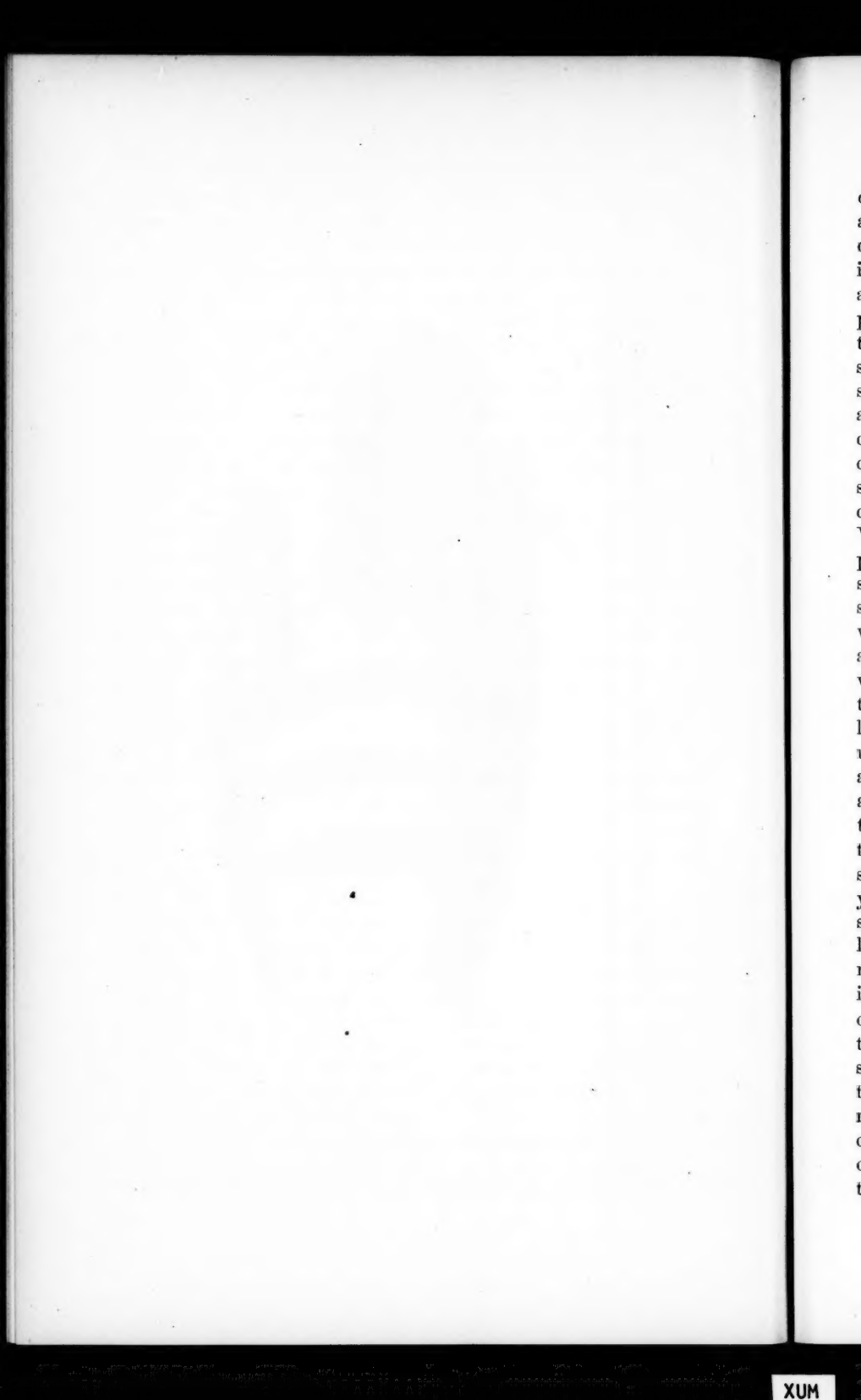
a distinguishing mark of the tribe. The hair of the men was allowed to grow long on the back of the head, but was cut square across the forehead, above the eyes. The women do not tattoo the face, but tattoo three bands across the back of the hands, with crosses over the knuckles, and two lines down the back of the lower joint of the fingers. The men tattoo the inside of the arms in bands that run to the shoulders and cross the breast. Tattooing among the men did not appear to be general, and may be confined to the chiefs and head men. They are armed with bows and arrows, firelocks and lances, though the latter weapons were the most common, being in the hands of every one. I saw a very heavy, rude gun-barrel, said to have been forged by them, and there was a hut in the village that was evidently used as a blacksmith shop.

From the fact that they have become so dependent upon their trade with the Pepo-whans, the practice of head hunting seems to have nearly gone into disuse. There were several skulls in niches in their houses, and I was shown a grass hut, with seven or eight skulls heaped in a corner. There were a number of small seats upon the ground, and as nearly as I could ascertain, this hut was used as a dormitory for the small boys, that they might get accustomed to the sight of the skulls of their enemies, and learn to prize them. The villages are upon steep hill-sides. The houses are built solidly, but rudely, of slabs of slate stone. Places are excavated in the hill-side, and the walls built up and covered with slate, the roofs slanting in but one direction, and that with the direction of the hill, so that the houses are hardly seen at a little distance. The roofs are supported by heavy cross walls inside, and by timbers, some of which have been rudely ornamented with carving. The doors, which also serve for windows, are so low that we had to creep on our hands and knees to enter. They are secured by slabs of slate set upright. The interior of the houses was clean and paved with slate, with low stone banks running around the sides for beds and seats. These were covered with mats, and such of the family as were not in the fields were sitting upon them, the women engaged in weaving mats and an open sack that is much used by them for containing burdens to be carried on the back. Many swarms of honey bees entered through crevices in the walls to cells made for them beneath these banks, and the savages make quite an article of trade of the honey and wax. They keep a few pigs and chickens beside.

The mountains all about the villages of the Kale-whan are almost entirely free from timber, there being only a little in the deep ravines, where it is almost inaccessible. The timber has probably been



Form of tattooing the hands practised by the women of the tribe of Kale-whau, living east of Takab Formosa, and near the village of Bankimseng.



cut off and sold by the savages to the Pepo-whans. Coarse grass and reeds have sprung up, and this, by giving food for annual fires during the dry season, keeps a new growth of timber from springing up. The only timber that we could see, of any extent, was upon a high ridge that showed a few miles to the east and which we supposed must be the water-shed of the island. This timber appeared to be pine, and probably the common Chinese pine which we saw growing farther north. The Kale-whan were cultivating the steep hill-sides, much as the Che-whan of the north, by drawing weeds and bits of slate stone together into little ridges to keep the soil and crops from going down hill with the first rain. Their principal crops were millet and sweet potatoes. They also raised a small species of taro that grows without irrigation, though the large plant cultivated by the Chinese must be continually covered with water. While we were among them, toward the end of February, they were planting their millet. Their agricultural implements are sharpened sticks, some of them two or three pronged, like pitch forks, and some of them shod with iron. Many mango trees just in blossom were scattered over the hills among their little plantations, and had apparently been planted or at least protected by the savages. Their villages were nearly hidden in trees, among them oranges and plantains and betel nut palms, for which latter the savages have a great liking. Like the Che-whan at the north they build granaries raised upon posts crowned with flat disks of slate stone to keep squirrels and rats from climbing up. These little grass-thatched structures, apparently perched upon stilts, formed the most conspicuous part of the villages. The Kale-whan seem to do little hunting but make out to add a few small fish and shrimps to their stock of food from the stream that flows through the valley below. We saw some of the young men fishing with a curious little circular net with pockets in several places for the fish to enter. They would inclose one of the large boulders, with which the bed of the stream was filled, with the net and then pry up the stone with poles and let it drop back into its place, scaring the fish that sheltered under it out into the pockets of the net. This style of fishing did not appear to be very productive, as they had caught but two or three small fish and a few shrimps. The Kale-whan are in the habit of coming down every third day to trade with the Pepo-whans in the mouth of a large ravine that opens into the plain. The Pepo-whans have a well-beaten cart road leading to the market place, and some fifteen carts, each drawn by two buffaloes, wound creaking along the base of the mountains to the general rendezvous. The day we visited them I noticed

that all the time the bartering was going on two or three of each party, savages and Pepo-whans, held upright long lances in the center of the market-place as if this was a signal of peaceful trade. The Kale-whan brought down back loads of wood and grass which they traded for a little cloth and salt and rum, this latter being an article as eagerly desired by these savages as by other savages the world over.

The Kale-whan, in times of scarcity, frequently sell their daughters to the Chinese and Pepo-whans, who take them as supplementary wives and make them useful as interpreters in thus bartering with the savages. While we were among the Kale-whan the chief offered to sell us three girls of the tribe at twenty dollars each, or its equivalent, in barter on fee simple. The poor girls were dressed up in all the finery the tribe possessed, one of them having a beautiful stem of wild red lilies in her hair, and were kept singing nearly all night before our door. They are a very musical people, and at night a large number collected in the house of the chief and the women would sing a monotonous but musical chant apparently as long as they could hold their breath, and then the men would answer in the same strain, winding up every time with a loud inspiration. We went among them during their seed time, and there seemed to be some taboo connected with it that forbade them entering their houses, and we found them all sitting around outside with closed doors, or at least with the slabs of slate that served for doors in their places. About midnight the taboo passed off enough so that they entered their houses, but there was still something that forbade them trading with us or assisting us, they even refusing at first to give us fire. Whenever one of the tribe, led by the display of cloth, scissors, etc., that we had with us, was tempted to trade us a pipe or an ornamented knife-scabbard, some one would pronounce the fatal word *parici*, and the trade was immediately dropped. There were some rare plants and land shells in the ravines which I wished to collect, but the savages seemed to think that it would bring some great evil upon them if they allowed me to take away any thing, and they almost compelled me by force to desist, pulling me by the arms and shouting *parici* in my ears. We were told that this taboo would pass off within four or five days, but we had no time to wait and so did not see them in their usual state.

The numbers of the savages of Formosa are hard to estimate. They are certainly more numerous than would be expected from the rough and mountainous character of the country they inhabit. They are weak and cowardly and badly armed, and their only safety is in

their woods and rocks, through and over which they make their way with almost the facility of wild beasts. Those who inhabit the sea coasts to the west are in the habit of plundering wrecked vessels and adding the heads of those of the crew who escape drowning to their treasures. They are said to be a fierce race and better armed than those of the mountains. The Chinese are slowly encroaching upon them where the soil and timber is worth possessing, but it will take centuries at the present rate for them to gain entire possession of the island, and it is probable that they never will conquer the whole island but will leave the most mountainous parts of the island in the hands of the savages, just as they have done in the interior of China itself, where there are many tribes of savages who do not recognize Chinese authority. There is probably no day of the year that passes without bloodshed along the savage border in Formosa. The savages are continually coming out and lying in wait for the Chinese, and the Chinese are in no way particular how they get the savages in their power and revenge themselves, but the Chinese government seems to have no concern in it. Those who live along the border understand that they do it at their peril, and that their death will not be noticed. The only means for defense or warning that we saw upon the border were undertaken by private individuals, and we saw one man, whose lands and property were exposed, who was offering ten dollars per head for savages.

The Island of Formosa lies about eighty miles from the main land of China, and is two hundred and fifty miles in length and eighty or ninety in breadth. Physically considered it is made up of a lofty range, or system of ranges, of mountains on the east side, with a rocky and precipitous coast on the Pacific, and rich level plains on the west, extending down to shallow seas in the Formosa channel, with immense sand flats, which are uncovered at low tide, and are apparently rapidly rising and adding to the cultivable lands. Several of the mountains are over twelve thousand feet in height, and the whole range from east of Takao for a hundred miles to the north must stand at near eleven thousand feet. In January, 1874, this whole extent was covered with snow, and it is probably so covered every winter. The highest mountains when visited were very steep, and were composed of slate rock with veins of quartz from an inch to several feet in thickness. The bases of the mountains and the foot hills are generally composed of coarse, friable sandstone, containing tertiary fossils. There are numerous plateaus among the foot hills and below them, evidently the remains of ancient plains that are now left far above the great plain below, the rivers having

cut down through to a lower level. Many of these plateaus are tilted out of level apparently by the rising of the mountain chain behind them, and the foot hills are evidently thrown up in this way, especially those east of Taiwanfu that were like great furrows in the general direction of the mountain range, the strata of sandstone of which they are composed being tilted at an angle of 20° , but growing greater toward the mountains.

The beds of coal which is found in great abundance at Kelung, at the north end of the island, are apparently in these superficial strata of sandstone. There has been considerable volcanic disturbances toward the north end of the island, and there are large boiling springs of mineral water and jets of steam bursting out in a valley a few miles east of Tamsni. Sulphur is deposited in great quantities, and the Chinese have manufactured it at some time. Petroleum is found flowing from the earth near Onlau toward the north end of the island, and we saw signs of coal on our way out from Posia to the east of Changwha. Gold is said to exist in the island, but this does not seem to be authenticated. There is a curious outcrop of limestone at Takao, near the south end of the island, comprising Ape's-hill, Whale's-back, and several smaller ridges connecting these and extending them. The dip of this outcrop is toward the south-east, almost opposite to the general dip of the strata in that part of the island. The rock is a porous limestone with many caves and crevices in it. There is much fossil coral and a few shells that appear to be of the same age as those found in the sandstone. Whale's-back is thrown up at an angle of about 45° in a great level plain of alluvium, and appears like a great broken piece of ice that has been thrown up and frozen fast in its place.

The southern part of the island is in the tropics. There is much rain in the north part of the island, especially at Kelung. At Takao and Taiwanfu, it is dry from October to April, but it rains much sooner in the mountains to the east, the rains already beginning there in February. Rice is the principal crop cultivated upon the low level lands to the west, and there is much exported to China. The best lands produce three crops annually. Lands that are harder to irrigate are planted to sugar cane, and large quantities of sugar are exported in foreign vessels to Japan and Australia. Upon the first of March ten or twelve vessels were lying at the ports of Takao and Taiwanfu, all loading with sugar. The culture of tea has but just commenced, but has already reached considerable importance at Tamsni. The kind mostly cultivated is Oolong, which goes most of it to the United States. The cultivation can be carried to any

extent in the north of the island, as there are great plains of high rolling lands lying from Changwha to Tamsni, of the rich red clay which is so favorable for tea. These high plains are the home of the camphor tree, many trunks and stumps of which still lie over the ground, and of the wild tea-tree, of which I saw one specimen, with the trunk a foot in diameter and thirty feet high. The inhabitants gather the wild tea, but it is of bad quality, either by nature or from being badly cured. These high plains are now lying desert, as they cannot be irrigated, while tea is one of the few plants that needs no irrigation. These lands lie near the sea where transportation is easy, while much, or most, of the Chinese tea country is almost inaccessible, the tea having to be carried many days on men's backs and then transported by boats down rapid and dangerous streams, before it can reach a market. Camphor is exported from the island, and most of the mountain land seems to have camphor upon it, but the drug is only procured by the destruction of the tree, and there is no replanting done. There is also quite a trade with China in camphor planks.

The Chinese population of Formosa is estimated generally at about three million, but this seems to be rather an under estimation of the real population. The most of them are from the province of Fuh-kien, which lies opposite, and many of them are descendants of the rebels, who took possession of the island with Koxinga. They are considered a turbulent race, and a rebellion happens as often as once in ten years, at least. They almost universally bind the feet of their female children, and child murder is not at all rare among them. At Tamsni, two little girls were picked up from the little jetty belonging to Dodd & Co., one of them still living, and it is not rare at all to find them wrapped in straw lying along the banks of the river, where they have been left by the tide. There are also quite a number of people called Hak-kas, who are supposed to come from the province of Canton. They speak a different language and live in separate villages, and they allow the feet of their females to grow to their normal size. The Hak-kas are especially numerous toward the north end of the island, though they are found nearly the whole length, occupying generally the lands near the mountains and most exposed to the savages. Formosa, though it has been settled by the Chinese within the last two hundred years, possesses some seven or eight walled cities, among them Taiwanfu, the nominal capital, Pitao, Kagee, and Changwha. Though of such modern date, they are built after the old Chinese model, which is probably very much that of the walls of ancient Troy, and they are intended to be defended by archers. There is no provision for attack or de-

fense with cannon. The walls of Taiwanfu are said to be seven miles in circumference; they are from twenty to twenty-five feet in height, and the same in thickness. They are faced with brick and stone, but are probably earth in the interior. Taiwanfu is built upon the sight of the old Dutch colony, and there are still remains of a small fort standing in the middle of the city, beside the ruins of the large fort called Zelandia, which was built to protect the harbor below. The present population of Taiwanfu, with the uncertainty that seems always to apply to Chinese cities, is estimated to contain all the way from thirty to sixty thousand people.

The Pescadores are a group of low flat islands between Formosa and the mainland. They seem to be composed almost entirely of basaltic rock, which is partly columnar in many of the cliffs. There is iron ore found upon Fisher's island. The rock of the island is barely covered with soil, but nearly their whole surface is cultivated during the south-west monsoon, in sweet potatoes, pea-nuts, and millet. The inhabitants are estimated at eighty thousand, and there are said to be thirty towns and villages. The town of Makang, which is the largest, probably has twelve or fifteen thousand inhabitants. Its harbor is good, but the entrance is intricate. The Chinese live generally in houses made of coral rock that is frequently cut into blocks. They are descendants of the Fuh-kienese, and are all fishermen. They have considerable trade with the mainland and with Formosa in dried fish and in hogs, which are fattened upon pea-nuts, and in pea-nut oil. The feet of all the women are small, though their hard and laborious life must make this custom troublesome enough. I saw one small-footed woman ploughing and driving the buffalo, though the wind was blowing a gale at the time, so that we could hardly stand before it. The islanders are a rough and uncivilized race, accustomed to hardships, and the charges of piracy and wrecking made against them, are, without doubt, true. They are the boldest of fishermen, and during the warm monsoon, are almost amphibious. I was there in January, when the weather was cold and the wind and sea high, but when they found that I wished coral and shells, they procured me large quantities living. The islands make a good place for shelter for Chinese junks trading from Amoy and Fuchan to Formosa.

The map used in traveling was one made by General Legendre, who was formerly United States consul for Amoy and Formosa. The only means of telling distance was the Chinese report and our own fatigue, and the only method we had of telling the direction traveled was by a pocket compass.

General Legendre's map seems to be very correct when he had the opportunity of personal observation; outside of this, as might be expected, when dependence has to be placed on Chinese data, there is little reliance to be put upon it. The arrangement of the mountain ranges appears to be imaginary.

The first journey made was from Taiwanfu north following General Legendre's track to Kagee. From here we left his track on the left and turned toward the mountains. After one day's travel we entered the mountains by the bed of a stream, and then we traveled a day and a half through a mountainous country partly covered with timber, with here and there a Chinese village. This country seems to be a sort of neutral ground, and all were armed for the last six or eight miles before reaching the lake of Tsuisia. We passed through a wild country covered with timber, where there was said to be much danger from savages, and only large bands of armed men passed. We found a fresh water lake, surrounded by cultivated lands, and with three villages of Trin-whan. An old Chinaman, living upon a small island in the lake, owned most of the lands, and had begun the cultivation of tea. There was a very high and steep mountain at the distance of a few miles, directly to the east of the lake. The lake has several species of eels and of fish, the latter mostly of the Siluridal. From the lake, a day's march, most of the way through rough, mountainous country, brought us to the valley of Posia or Polisia. There were many beautiful tree ferns seen on this trip and camphor trees. The valley of Posia is six or seven miles in diameter, and is not all cultivated yet, as rice cannot be carried up such a distance to market, and the inhabitants only cultivate for their own use. There are several beautiful streams flowing through the valley, which, when they unite at the bottom, are well deserving the name of a river. The settlement of Posia seems to be very near the situation of a town on Legendre's map called Ou-gitang. We inquired in vain for this town, and came to the conclusion that it was imaginary. Posia is surrounded on all sides by mountains that are covered with timber. We saw several species of oak growing here with a pine and a wild apple, which the Lek-whan gather and boil for eating. There is also much camphor-wood, but distance to market makes it impossible to use it as yet. From Posia we went a day and a half's journey almost due east up a roaring stream that forms part of the river at Posia. For the first ten or twelve miles the rock was mostly sandstone, and on the north side of the stream the timber was composed of dwarf pine and oak, with no undergrowth but coarse grass. On

the south side, the mountain, though just as steep, was covered with almost tropical vegetation, among which were tree ferns, wild plantains, rattans, etc. As we went farther up, the vegetation became more scanty on both sides. We found the savages cultivating the steep hill sides, the rock now being slate and quartz. At last we reached the water-shed, having followed the stream we were upon to its heads, while we could see the country descending on the east toward the Pacific. Most of the country here seemed to have been under cultivation at some time, and had grown up to a second growth of timber, twenty and thirty feet in height, of a species of alder, closely resembling the one called tag alder in the United States.

Upon our return to Posia we started out toward the coast with a large band of Lek-whans as guides and guard. We followed the river for the first day through a rough, but rich and timbered region. At night we camped on the river, and near a fine valley, where there were still walls of houses and remains of ditches for irrigation, made by a body of Lek-whans, who settled there some twelve or fifteen years before. They were harassed so determinedly by the savages that they had to desert the settlement. Soon we broke out of the mountains, having left the river on the right. There were several guard-houses, with soldiers guarding the ravine we came down from inroads of savages. We hove here in sight of Changwha in the distance, and of the goat-plain, but we turned to the north and stopped at the Lek-whan town of Toasia. They have rich rice fields about here, and the country is very productive, but they are in debt to the Chinese. From Toasia, a day's journey took us to Laisia, part of the way being over a dry plain that had once been part of the great valley, but had been left high and dry by the streams cutting through to a lower level. Laisia lies in a beautiful valley among the hills and plateaus. There are two small villages, a few yards apart. On my journey toward Tamsni, I passed large quantities of camphor, most of it cut and lying on the ground, a short distance to the north of Laisia. The timber has been cut by the Chinese for the best part to be sawn into planks; the rest will lie until it is packed up and carried away to be distilled for the camphor. Between Laisia and Tamsni I passed many places fitted for the cultivation of tea. After reaching Tankiang, I followed General Legendre's track for the rest of the way.

Lists of words were procured of the native tribes. The first list belongs to the Tsui-whan. The second list belongs to the Lek-whans,

who have their principal settlement at Posia and two neighboring villages.

The Che-whans, from whom the third list was procured, inhabit the adjoining district. The Pepo-whans, from whom the fourth and fifth lists were taken, occupy the large track of country to the east of Takao and Taiwanfu; while the Kale-whans are among the mountains further east. From these was procured the sixth list of words.

VOCABULARIES FROM EIGHT ABORIGINAL DIALECTS OF THE ISLAND OF FORMOSA,

Collected by J. B. STEERE, University of Michigan, during the winter of 1873-74.

SIX LISTS OF WORDS FROM THE ABORIGINAL LANGUAGES OF FORMOSA.

ENGLISH.	TSUI-WHAN.	LEK-WHAN.	CHE-WHAN.	PEPO-WHAN.	PEPO-WHAN.	KALE-WHAN.
I	yākó	yākó	yākó	yāū	yāū	kiāmún
thou	ihó	íssú	íssú	ínūhú	ínúhó	timādún
he	lātōró	íssú	íssú	ínūhú	íní	timādú
we	yámln	yámí & ílá	yámó	—	—	kiāmún ?
you	lātāwán	ímóu	—	—	—	—
they	ítíawán	yāslá	ābārō ?	kāqūdúng	—	—
man	sput	sáuh	édúk	āmámá	ámá	—
woman	mínyāwát	māmaís	mākādíl	íníná	íníá	áláí
		young woman—				vāvālán
		máki jápái	wáéwá			
girl		rākthál-māmaís	lakál-mākādíl			tíní
boy		rākthál-māmā-	lakál-úsínáō		ámá	tíunú
		ling				
man	ájūdí	māmálung	yākó-úsínáō	tíh		chikúl

wife	tāi ná	nák māmáis	yá kō-makāndil	ki qāung	—	valáv
son	āi āiák	nāki-rākihāl	lakāi	āiák	ānāk	āiāi
daughter	mínāngwāt-āi- lāk	rākihābō-māmāis	lakāi makāndil	āiāk ?	ānāk inā	āiāi-vāvāinā
brother	—	(elder) māmāh (younger) sōadzī	nīkiāl	nīqāhā	mākā-ībībī	kākā
sister	—	sōadzī-māmāis	sōadzīmākāndil	bīfin	mākā-ībībī	lāi rā
uncle	tāmā	(elder) bābā (younger) māmāh	māmā	—	—	—
aunt	mínāngwāt-inā	(elder) tātā (younger) yāh	—	—	—	—
mother	nākā-inā	inā	bōubōu	jēnā	yān-lāinā	inā
father	nākā āmā	ābā	tāmā	dāmā	āiāi-kīlāmā	āmā
head	pūnō	pūnū	tūnūch	būnqū	būnqū	ūrū
hair	pōkīs	bōkūs	chinūnūch	bōkū	bōkū	ūvāl
eyes	māsā	dōwrīk	dōwrūk	mātā	mātā	māchā
ears	sārīnā	sāng-īrā	bīrūt & bīrūtke	tāng-īrā	tāng-īrā	chāringā
nose	mūlin	mūjīng & mūz- īng	mōhīng	gūng-ūs	h'gīngī	n'gōdūs
mouth	lūltē	rāhāl	kōāk	mūtūt	nūhū	hāngāl
teeth	nīpūn	līpūng	rūpūn	waltē	nīngūt	hāliss
hips	būpī	rūlī	pādāhūn	bābībīt	bībī	lūrūt
tongue	āmā	jāhāmā	hēmā	dādīlā	lālīnā	sīmā
chin	bībī	wākā	būktūlī	tāktāk	tāwī	kāvīj
beard	bīlū	mūdūs	mūdūskī	gīngī	tāpū	n'gūtīgī

SIX LISTS OF WORDS FROM THE ABORIGINAL LANGUAGES OF FORMOSA — (Continued).

ENGLISH.	TSUT-WHAN.	LEK-WHAN.	CHE-WHAN.	PEFO-WHAN.	PEFO-WHAN.	KALE-WHAN.
throat	holahó	bákung	inelúthíng	—	babítáu	ríó
neck	ōukán	hāhór	—	kūdúúk	—	ūdún
shoulder	kálafá	ábáhá	áhíng	tógú	ānūn	āván
arm	bitrillin	upper arm — bín- āngwán	ábáthá	párió	limá	vālangá
elbow	pókó	jíkú	pūng-ú	páúk	tāpūúng	píkú
hand	limá	rímá	ábáthá	dādúkám	limá-kāamítáu	kāvfaán
finger	rímá	kākāmūd	tulūdíng	kāgāmús	kāamítáu	gālogāváu
thumb	tókātókásh	tātūdū-dzāhāmá	—	—	—	—
finger nail	kūkú	kálikúh	kúkúh	kalúnkúng	—	kālaskúsáu
breast	pákú	zūbūzūb	tūmúg	abú	abú	vārún
leg	bāntát	kārō	pápúk	(thigh) — páá	tíkát-(thigh) páá	(thigh) — dāpál
knee	kálú	íláss	pūng-ú	dūdú	pūúng	chūng-ál
foot	kakái	dādápál	kāpál-pápúk	tínatin	tíkát	kārāpūkápáu
big toe	fátfat	—	—	(heel) — lūgú	(heel) — kākūlúng	(heel) — píchíng
toe	—	kākānūzdú kārō	jitió-pápúk	kāgāmús	tíkát-kāamítáu	gālogāváu
toe nail	kūkú	kálikúh-kārō	—	kalúnkúng	—	—
blood	tātsóm	dāmúh	dará	gāmá	nítú	dāmú
heart	rísí	bābuh	tāmābāhák	abú	mēwé	vārún
fish	tótsāó	alāó	chūruk	tug	kāhán	chiáv
deer	kuñáu	lūhút	tāmát	nāng	kípnáu	vūnáu

cow	kālābās, knūāu	noāng & bālāsā- noāng	dāpā	loāng	nuāng	luāng
hen	lāuāō	pātārō	rōwdūch	tāhūkā	ūkā	kūkā
dog	ātū	wādū & wādū	hūllng	āsū	kīhōu	vātū
cat	kālōtā	balāu	nāu	lūkāō	kīnyāō	nāv
egg	kālōsōi	bātū	bāllng	pōpāk	kīpē	chīrū
bird	lūngfāt	āām	bāhānī	āām	bānāng	āām
feather	kōpūr	būkūss	ōubāl	rībng	tōpū	pārāl
pig	bābuī	bārūzāk	bābūi	bābūi	bābūi	(tame)-āchāng (wild)—bābūi
snake	tsōlāu	ūdūūd	kōuzōū	bālāl	būnāl	ātūbī
tree	kāvī	kāhōi	kāhōnī	dūkūng	kībīng	kāsīv
leaf	fūnfūn	rābākō kāhōi	hājī-kāhōnī	hāpā	hāpā	ōsāv
root	flā	hāmūs	—	—	—	—
flower	bōkāl	tūlātā	rāpārāp	tsīb	kīlāpī	tāvā
fruit	ālēntsōmāi	mādū	—	māngās	—	kāmāiā
grass	smēr	sīmūr & sībūl	shūdūh	ūzū	ūlū	chūnūr
plantain	fīd fīd	bālūbāl	bālēbāl	dēm	būnbūn	vūlūvāl
sweet potato	būnā	dādāss	būngā	tāmāmī	tāmāmī	vūrāsī
rice	lāsō	lāsū	bārūss	pāk	kīpē	pādāl
samsu	kīhlā	lūsāt	sīnāō	tt	ālī	vāvā
salt	—	pāhār	tūnū	—	vāiā	ātā
sugar	—	yāmādū	—	—	whānū	ālū-ālū
water	tsārūm	dālōm	kāsīā	dālōm	lālōm	dzālōm
river	wākāss	rāhōng	dzādāzūng	āqīāng	āyāng	pānā

SIX LISTS OF WORDS FROM THE ABORIGINAL LANGUAGES OF FORMOSA—(Continued).

ENGLISH.	TSUI-WHAN.	LEE-WHAN.	CHE-WHAN.	PEPO-WHAN.	PEPO-WHAN.	KALE-WHAN.
sea	bālākáu	āwās	chilūng-tímú	bāúng	túm	iváváo
lake	—	rúmáó	chilūng	—	(wind)—bābí	(wind)—vāri
rain	kūsál	mudál	kúzúk	ūdán	múláu	ūdál
clouds	kālí	rūlúng	rūlúng	rábá	būlísúm	kārvuvuváu
thunder	bārūn bōun	kūrass	mābūrúá	dūng-dūng	lūngdūng	dzūng
lightning	hārbák	mālpáúd	sāsámá	—	sister of thunder	rādáp
sun	tisát	líjáhk & lídáhk	hídāó	wágí	kíawí	ādáv
moon	furál	líass	ídass	būrān	būlán	líass
stars	tāhlatát	bíntúl	—	ātātíng-ākái	tēngéngé	vítuán
day	tātākālí	(morning)-líahán	kūshún	mātakúh	kílāmá	kādāmál
night	hómhóm	(evening)-hínfán	bábíán	mādūng	ābígānán	tāsārím
light	hesál	pūdísáhk	límadúch	mādamá	múlémé-átó	malíá
dark	mínūmhóne	súm	múkúún	mādūng	mābūlshátó	ērpúss
fire	ápwi	hápñí	púnúk & hápú-núk	ápui	ápui	sápñí
smoke	mārūmóun	ādáh	kārēngúl	labú	māatú	símfliss
flame	—	hūrūhūrā-hápñí	—	—	—	—
ashes	tsilá	bídú & bídzú	mākalách	—	ābñ	āvú
wood	mālāusók	kāhōi	hārúng	pāñ	kāyñ	kāsiv
mountain	hūdún	biñayá	dāgtahk	būkúng	kíbūkái	vāvév

stone	fūātū	bātū	bātūnūch	bātū	achlāi
sand	būnāl	būnād & būnādžā	bānākāiūh	lāpūn	īpū
silver	tsūi	pīlāh	pīlā	mānītūk	pāsū
iron	bōlīs	kāhā	hīlūi	mānī	vātūlāiūn
copper	—	kānāwāng	hānāwāl	—	—
glass	mātūnlāt	pōhīlī līngwāu	—	—	—
knife	prāmūāu	tādāō	sīnmādāt	ūlūt	tākīt
spear	suābūnāu	dādakūss	sīnbārāngān	—	vūrū
sword	fūūss	mātārātādō	sīnmādāl-kānā-dish	wood knife—tā-kālī	spoon—kījing
bow	spālīsāu	būdzūch	bāhānūk	kūh	vākrā
arrow	fīblāt	rāwīl	būdīh	—	vūūlātān
cord	fūtūt	sāris	sīnūzūch	—	—
gun	pūtōum	pātūss; pātūss, to shoot	hālūng	lāntū	kwāng
powder	kāfō	ābōū-pātūss	kābōultt	—	īdūng
shot	fīlūsh	hādāng	būll	—	nāmūk
house	town (like English town)	bullets—bōār	sāpāh	hāmādūng	tāpāv; village
roof	tātūk	hūmā	dīnāmūch	ālūb	—īnālān
door	pīlāō	tlāp	rēhēngūn	mātāp	tādtīdīvān
canoe	hrūthā	rāhāwānān	āsū	—	chēlēvān
paddle	pārūthā	pārānān & pārān-rāh	tātākūh	—	mārūkōr

SIX LISTS OF WORDS FROM THE ORIGINAL LANGUAGES OF FORMOSA — (Continued).

ENGLISH.	TSU-WHAN.	LEE-WHAN.	CHE-WHAN.	PEPO-WHAN.	PEPO-WHAN.	KALE-WHAN.
good	măktán	réák	mălnh	măgani	măláng	núngwá
bad	măkarmáu	sădtál	măkáh	măbuhú	méchéméd	năkwíá
sweet	mădăboun	tuhubúss	săsbúss	măhămí	măhămí	ălū-ălū
sour	măkătho, (th in thing)	mărinú	tăbăshi	măăgmí	măărinú	ătérfo
bitter	môhnăr	pănjid	măngfhăr	—	măăwă-bútáp	wăkwíá
ugly	măbôkănór	kălălăkún	séchéhăún	mădtúng	méchéméd	—
pretty	măktán	kărún	măbătunéh	măbútřă	măălř	núngwá
long	măkărŋi	hălúpăs	kănădřsh	măhădăk	mărinăo	vărú
short	lúsh	hătkřl	déhăkřh	măkúsing	măkřtřn	lřkt
big	măřwřn	mătarú	părú	măăzăng	mădăřo	ăchă
little	mătôpŋ	tătk	třkřh	măúsing	măutřt	křřkřř
round	măkărēmôsřt	kăřtřch	mřřēmřch	măřřng-ărřng	măřřř pŋŋ	ěvřchikădău
square	vătó	săpătă zŋkřzŋk	nřřsăpôtălăř	—	—	—
warm	mătăřă	mŋlălăp	mătăřlřch	mădălăř	măkărđ	mătsŋlŋ
cold	măsŋlăo	lămřk	mřřkřtř	măhăumŋng	măăsřm	lŋlŋ
hot	—	mădălăss	mătăřlřch - tă- dăo	mădzălăř	mătănă-bútáp	zărăngzăng
no	ôă	kôăh	ôukăh	ăkôusăř	nŋmă, kăś-ăř	nřkăh
yes	ănř	řsăřă năhădăř	bălăřwă	hăř	ěhř, třnř	ěwř, părř
I run	măshăřăđă	yăkô-mřtălăm	mřtŋgŋsă-yăkô	yău řnpăt	řsăhřm	măvřřđ

I eat	I eat rice—āmā- kán ájō	yākō-kākanāi	yākō-nānak mā- kán	yāu māhāngāi	māntā	kānū
I smoke	āmākān-tāmākō	dādōhāi-tāmākō- yākō	mākān-tāmākō	yāu tāmākū	māntā tāmākū	kānū tāmākū
to drink	nīkhlā	dādōhāi-yākō	yākō-mímāh	—	mítākūnhāi	tūmākūr
walk	ōshūmpādō	dzādzākāi-yākō	yākō-mākāisā	yāu-mūdādarāng nod—mārisip;	mālālālān	līmāvāch
lie down	māsūtīl	pāhārāsāi-yākō	tārūkārūk-yākō	mārikū	—	tāāt
sleep	māpūshkāt	mūdāmāi	mātākāi	mārikū	mīrūptā	mūring
die	māthāi	pōvrēhādāi	māhōkāl	māpātāi	māpātāi	māchāi
go	—	mūkūsā	mūshā	mādarāng	mārāntā	vākāngā
come	itīthā	mōpūzāh	māuzāch	māpūnākūlī	āinī	ōjing-āngā
buy	mūshnāō	mōbārō	—	pélākūlī	pāināākūnī	vūnlī
sell	āfārō	māhē bārō	—	mīrākākūlī	mātrānā	vūnlī
cry	thmānīt	māngīdz	lēmīnīsh	māngī	mātānī	mōw
laugh	māsāsānā	māhātān	māhūlīsh	mātāwā	māngūsī	jīmīrī
sing	mākākūyāsh	mātūrāi	mēōyēsh	ūrūrō	māulātū	sūnlāi
talk	mātlīmīlā	mākākāwāsāi	mārangāō	māsūsūt	mābōā bōātā	tvē
work	ārārān	—	kūmēpāch	mūmā	—	māsūng sūng
cook	roast—ōpūshnārā	roast—mōhārūb	pāpōrūi	tākū	mānāsūngāsīng	kūmsā
		cook—mārāmāi	hamāngūt	—	—	—
boil	ōpīntālā	tātālūk	—	—	mākīn kīnkīā- hān	tīpānā
fish	mānthā	mātākāpīs	—	—	mōpnāpnāu	mālūp
hunt	pānāk	mālūp	—	mālūp	—	—

SIX LISTS OF WORDS FROM THE ABORIGINAL LANGUAGES OF FORMOSA — (Continued).

ENGLISH.	TSU- WHAN.	LEK- WHAN.	CHE- WHAN.	PEFO- WHAN.	PEFO- WHAN.	KALE- WHAN.
fight	mápháthái	móházáb	—	sásáát	—	dímókór
1	táhá	ádádúmút	kíál, óní	dúhá	sáát	tiá
2	túshá	dúsá	dáhá	túrú	lálúhá	dúsá
3	túrú	túrú	túrú	táhát	tátúrú	térú
4	spát	súpát	súpát	túrímá	hápát	spát
5	hrímá	hásúb	rímá	túnúm	lálímá	rímá
6	stúrú	búdá, hású búdá	mátárú	pítú	ánúm	únúm
7	pítú	hásúbídúsá	pítú	pípá	pápítá	pítá
8	káspát	hásúbítúrú	músúpít	kúdá	túdá	hárú
9	tánásó	hásúbisúpát	mung-árl, nárí	kéténg	—	shívá
10	máksín	shíd, íssít	náhl	—	sáátítín	tápúrú
1	fálfál	másúádzáwádz	chéchikáh	—	20—lálúhá kíten	11—ítá-tápú-
					30—tátúrú kíten	rú-ítá
						20—dúsá-ta-
						púrú
						30—túrú-tá-
						púrú
part	tátábóhát	dáho	—	—	—	—
many	mánásá	húhú	égóu	mádh	máhpák	pákárló
all	máshá	dádóá	gámút	sásán	búlúng-ái	mápulát
few	ladádó	ínúdhó	blúk	ákóusáí	tápitéátú	mávúkúl

when	pāndū	kāsān	kānūāu	tīmāng-kōkānā	būnā	
how many	lākūthā	hāmā	kānābānū		hākmūnā	
where	—	kāāsāi	mūā		—	
who	kōūthān	imā, imēlā	imā	tāgāmī	tāāmī	inīrī
north	—	āmsān	tūng ārūt	tāgātīmī	tātīmā	ināvāl
south	—	rābāhān	tāgāeril	tāgājā	tārālā	idzālā
east	shāchānō	dāiā	dāiā	tāgālāūs	tāārūt	irūj
west	tāntōān	rāhūd	hūnāt	māpāng	mārāmān	ūdīlī
red	mākōūthā	lūbāhéng	mātwāch	māpūlī	māpūnī	bōchīrāl
white	māpōūthī	rīslāō	bāhāgāi	mākūtāng	mākūnūng	vūrāv
yellow	mābōūlāō	tābārāk	tānāch-māābōh	tābūrūsūng	—	tāpūyū
blue	mādīshlūn	māngāiāh	māsāmā	—	—	chīv chīv chīk
green	mādīshlūn	tūrūlīch	—	māidūm	māidūm	mātāk
black	mākōtsām	tūrūhāl	mākālūch	—	—	

LIST OF WORDS FROM SAVAGES LIVING EAST OF ONLAU, NEAR FOOT
OF MOUNT SYLVIA, FORMOSA.

(Furnished by Rev. Mr. MAKAY, Missionary at Tamsui, Formosa.)

Sun=ālulá; moon=jiláss; to-day=kālsún; to-morrow=zūnún; world=hālāō; water=mākidālóm; fire=sidūsū; forest=hātitalé; friend=hini; good=kālā; 1=āhā; 2=lūsā; 3=tuló; 4=sūbāt; 5=lūsib; 6=sēbūsā; 7=būsāhā; 8=kāsipāt; 9=lūāhā; 10=lāng pui; 11=lāng pui āhā; 20=sāmfiā; 30=mātul.

LIST OF WORDS FROM SAVAGE DIALECT OF PILAM, ON EAST COAST
OF FORMOSA.

(Furnished by Rev. Mr. RITCHIE, Missionary at Takao, Formosa.)

Head=tugró; eye=mātā; nose=āting rān; month=sidān; face=tngúr; ear=tu—; hands=ālimā; body=ālādūk; feet=lāpāt; house=ārūmā; heaven=ānāngit; God=āiulúss; sun=ākādān; moon=ābūlān; stars=ātiūr; wind=āvālē; man=ātaū; mountain=ādēnāu; rice=rūmāi; heart=hirāngārān; good=māvā; bad=kōātēsh; dark=ārūmūng; heat=bēús; wood=kāmē; water=ālnāi; sea=ālni; fire=āpui; earth=dārīk; village=ātikāl; east=āmē; west=timūr; north=lōūd; south=dāiā; male=mālnāi; female=bābāiān; child=ālālūk; my=ikō; thy=fōh; his=itaū.

SENTENCES FROM THE LANGUAGE OF THE TSUI-WHAN.

I eat=yākō mākān; thou eatest=ihō mākān; he eats=hōyātātā mākān; we eat=māshtā mākān; they eat=hōyātātā mākān; my knife=nāk fūnūsh; your knife=mfō fūnūsh; his knife=tūsāi fūnūsh; our knife=shākshūnān fūnūsh.

SENTENCES FROM THE LANGUAGE OF THE LEK-WHAN.

Rice is good=riāk kālísū; how many fish have you?=hālmā ālāō pāisū; I have four fish=māhādžā sūpātā ālāō yākō; I have no fish=īnimārā ālāō yākō; to-morrow I will go hunting=sārāwān māūsāi mālūp yākō; yesterday I went hunting=ōkājīhā īnimālūp yākō; to-morrow he will go hunting=sārāwān kāōsā mālūp issū; I am going hunting=yākō māūsāi mālūp; I am going fishing=māūsāi mārāō ālāō yākō; I am hungry=mākē yākānūn yākō; where are you going?=māūsāi pāisū; I am going to Posia=māūsāi Pōlīstā yākō; I have been in Posia=sī Pōlīstā yākō; the sun is very hot=mūbizāh hūhūl; when will you start?=kāsaīān pāikā dūlāi; how must I do?=sāsāi īnīlā; last year my father and mother died=ōkāzā kōwās pōrēhāt nākī ābā īnā; last year my father died=ōkāzā kōwās pōrēhāt nākī ābā; my father will die next year=pōzāhā ōzāng kōwās pōwrīhāzāi nākī ābā; yesterday I ate fish=ōkājīhā kāmōkōūn ālāō yākō; I am

eating fish=kākān ālāō yākō; to-morrow I will eat fish=sārāwān kākānāi ālāō yākō; yesterday I drank tea (water?)=ōkājihā mōdōuch-o-dālūm yākō; I am drinking water=dādōuhō dālūm yākō; to-morrow I will drink water=sārāwān-ka-dādōuhāi dālūm; you have come=mōpūzā hāimū; you are going=mōusāi yāmī; you wish to go=mōusāi lā; come again=ōū ālōū; my knife=nākē tādāō; your knife=nīssūā tādāō; his knife=nīmīssūā tādāō; our knife=nītā tādāō.

SENTENCES FROM THE LANGUAGE OF THE CHE-WHAN, EAST OF POSIA.

My knife=sīnādāt yākō; your knife=sīnādāt īssū; his knife=sīnādāt nūkagā; our knife=sīnādāt kānāshēdūk; their knife=sīnādāt nātāhā.

SENTENCES FROM PEPO-WHAN LANGUAGE OF BĀNKIMSENG.

I eat=māntāntū kūnē; I have eaten=mābāt kāwālū kūn; to-morrow I will eat=flāmāi mānākūn.

SOUND OF THE VOWELS AS USED IN THE ABOVE VOCABULARIES AND SENTENCES.

ā as in father, ä as in hat, ē as a in fate, ø as in met, í as ee in meet, í as in hit, ō as in no, ō as in not, ū as oo in moon, ŭ as in hut, ũ is nearly French u; all vowels are marked with their quantity. The lists were procured with the help of a Chinese interpreter, and some of the ambiguities and imperfections were caused by using the Chinese language as a means of communication. The vocabularies from the Tsui-whan and Lek-whan languages were made with much care. The two lists from the Pepo-whans, east of Taiwanfu, were taken from old, toothless women, and cannot be implicitly relied upon, as neither of the women were able to pronounce distinctly. The first Pepo-whan list is from Kongana, where the old manuscripts were procured. The second Pepo-whan list is from Bankimseng, and there is difference enough in them to render it probable that the Pepo-whans, east of Taiwanfu, are composed of two or more tribes that have coalesced in recent times. Their language is dead, and only a few very old persons remember a few words of it. The list of words from the Kale-whan was procured from a woman of the tribe, but there was no opportunity afterward of comparing and correcting the list through some other person of the same tribe. The list of words kindly supplied me by Mr. Ritchie, of Takao, were procured of the chief of the village of Pilam, which is on the east coast, and supposed to be nearly east from Takao. The chief and several of his tribe came around in a Chinese junk, and were treated for a disease, from which they were suffering, at the Missionary Hospital in Takow.

LEK-WHAN MUSIC AS SUNG AT POSIA, SET TO CHINESE WORDS.

No. 1.

Siong te Chong tso thm^a Kap tre, si^a chiaa

Ban mih talk hang oe; kong lo

Keh toa in Keh Khoah chih ei

Chong ho Eng bo— soah.

No. 2.

Choa kan thian tong ing oah so tsai

che mug che lo oeh oeh pek gai

No. 3.

siong te pah siu ti kong la

bo tang lim chiah bo tang kiah.

